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“BARGAIN” BUYING IS PENNYWISE

By WALDO HUTCHINSON



N inventory of about \$500,000 was reported on the balance sheet, as of June 30, 19—, of the “A2 Mfg. Co.” About \$400,000 of this value was represented by raw materials. Naturally this appeared under the classification of “current assets” and it was observed that the ratio of current assets to current liabilities was healthy, from a banking standpoint. Also the working capital, as represented by the difference between the current assets and current liabilities, appeared to be ample from the classification of figures as shown on the company’s statement.

This statement was presented to the company’s bankers with a request for an extended line of short-term credit. The moneys applied for were to be used to convert the raw material inventory into finished goods. Orders on hand also indicated a favorable condition. From the information submitted it appeared, at first glance, that the loan was warranted.

Inventory Is Found Unbalanced

A detailed investigation of the inventory brought to light a peculiar situation and one that upset the inclusion of the major part of this inventory value in current assets, and hence working capital. The raw material was divided into nine major groups. Of one group there was available sufficient material to manufacture corresponding parts for some 8000 product units. This was one extreme.

The other extreme consisted of a group of raw material sufficient to manufacture corresponding parts for but 800 completed units. Therefore, in order to make available for completed product manufacturing all of the material of the first group, it would be necessary to purchase additional material of the second group for 7200 units. The quantities of the other seven groups fell somewhere between the two groups mentioned. It was calculated that in order to make 20 per cent of the value of the raw material inventory of \$400,000 available for conversion into the finished product that an additional expenditure of some \$40,000 for raw material was necessary, and that in order to make 80 per cent of the value of the raw material inventory available, purchases of some \$300,000 were necessary.

It was very obvious, therefore, that but a small part of the inventory in its unbalanced condition could be correctly classified as “current assets” and that the financial needs of the company for the conversion of its inventory were far greater than had been anticipated and applied for. The apparent healthy condition of the company, as reflected by the balance sheet statement, was changed to indicate a rather weak and uncertain position. It was of interest to determine the reason for this condition.

Excessive Purchases Caused by “Price Bargains”

Upon investigation it was found that, about a year previous, the purchasing agent discovered a “price bargain” in this over-purchased item, and purchased all that was available. For a number of years practically all inventory items were drastically unbalanced be-





EXCESSIVE purchases at "attractive" prices result in seriously unbalanced inventories.

A policy of buying at the lowest possible figure often leads to delays in deliveries and losses in machine time, not to mention the receipt of products that fail to meet manufacturing requirements.

A manufacturer making a major part of his profit out of changes in inventory values departs from his main function of adding value to materials by processing and becomes a speculator in supplies.

Inventories, badly out of balance, lack real availability value and cannot be classified as "current assets" as a basis for extensions of credit.



cause of the general policy of the purchasing department to buy at any time in practically any quantity if "price bargains" were found and almost entirely without regard to production requirements.

In connection with examinations made for the purpose of determining the value of proposed financial issues or whether or not large commercial loans or extensions of credit are warranted, one of the many items critically examined is the inventory.

How a Highly Developed System of Production Control Failed

The "B" company, a leader in its industrial field, prided itself upon its highly developed systems, statistical and control methods. The information gathered and the effective use made of this information were remarkable. The company operated on a quarterly schedule basis. The sales department made an elaborate analysis of the market possibilities for the approaching period. Sales quotas were set and every inducement was given the salesmen to meet their quotas. From these quotas a master schedule of manufacturing requirements was developed and submitted to the production department as a basis for planning the next period's production. The production department in turn analyzed the material requirements and prepared purchase requests, in each case specifying the date when needed. These were submitted to the purchasing department. The purchasing department was highly organized from a system standpoint. The dominating slogan was "Purchase Goods at the Lowest Prices." Hence, on every item of a cost of more than \$500 requests for bids were mailed to as many sources as could be found.

The writer became interested in the machine record charts of this organization. These charts graphically indicated the planned operating hours of each machine tool and the actual hours. The reason for idle machine time was indicated by various symbols. One department showed an unusual amount of idle machine time and the reason indicated was "waiting for materials." It was also found that several other departments were seriously affected by the idleness of this department. The cause was traced to the purchasing department and the reason for the absence of the needed item of raw material was discovered.

It appeared that on this item of raw material requests for prices were sent to a large number of sources and many of these sources were new. There was nothing unusual about this, but part of the recognized routine, especially since the quarterly requirement for this item was valued at about \$50,000. The quoted prices from the various sources did not fluctuate to any great extent, the lowest, however, was some 5 per cent below that of a former source.

In accordance with routine the entire order was placed with the lowest bidder at an apparent saving of about \$2,500. The usual promise of prompt deliveries according to stipulated requirements was made by this source as also by the others. The source, however, was a new organization and not prepared to handle an order of this size during the allotted time period.

Idle Machine Losses Exceed Price Savings

In order to aid the situation a frantic search was made for small lots available for immediate delivery and limited quantities were obtained at a substantially higher unit price and at express rate charges in place of freight rates. Records indicated that losses due to idle equipment and delays of completed assemblies were in excess of \$1,500, and it was estimated that an equal amount would probably be lost before the situation was brought to a balanced condition. This occurrence was of value to this organization for it brought very forcibly to its attention that other factors besides "lowest prices" were of importance in purchasing, and that the common sense use of a system mechanism is even more important than the theoretical perfection of the mechanism itself.

Manufacturing has been described as a process which increases the economic value of materials by the application of human, mechanical, electrical or chemical energies or forces. Theoretically, therefore, a manufacturing enterprise should obtain its profit as a result of this increased value rather than through any market rise in the value of the raw material. In practice, however, during periods of increasing prices, many industrials profit also by this rise in value of their raw material stocks.

Occasionally one finds manufacturing enterprises



whose major profit, and at times all of their profit, is made from appreciation of inventories and "futures." This method becomes more prevalent during periods of rapidly increasing commodity prices. In such cases the manufacturer in reality becomes a broker or a speculator on the material market.

Close Cooperation Between Buying and Using Departments Needed

The "C Mfg. Co." produced what is termed an assembled product; that is, about 80 per cent of the parts in the completed unit were so-called standard parts and purchased complete from outside sources. The production of a new model was planned, and in order to cope with the competitive market situation a cost limit was placed on these parts. The engineering department prepared complete specifications for these parts and on some of the more important parts actually stipulated the source. On one unit a difference of \$40 each in the price of two manufacturers was discovered. The one specified by the engineering department was the higher.

From a layman's point of view there appeared little or no difference in the two types; so the purchasing department, without further consultation with the engineering department, contracted for the purchase of 1000 of the lower-priced units at an apparent saving of \$40 each. To the dismay of the purchasing agent it was discovered that although this lower-priced unit could be readily used, changes in designs of other parts were made necessary with an added increase of some \$95. Hence, an apparent saving of \$40 in reality increased the cost of the completed product some \$55.

Where close cooperation is lacking between those who specify and those who procure, cases like the above are not infrequent, especially where the items are of a somewhat technical nature. In the examination of inventories one frequently finds items of considerable value classified as obsolete because when delivered they agreed with the purchasing agent's orders, but were not adaptable to the needs. Frequently returns to the source were difficult, and also at times a happy optimism prevailed that at some future time use would be made of these items.

Practically all companies made an effort to dispose of non-useful items, but this operation is usually at a substantial loss. Purchasing is but one of many functions in the cycle of business. Its effect, however, on other functions and activities is far-reaching. The purchasing department comes in direct contact with the engineering department, or specifications department, for specifications; with the production department for quantities and time of deliveries; with the receiving and inspection department on quality and quantity verifications; with the traffic department on routing and tracing of incoming shipments; with the

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THE relationship between inventories and other financial measuring devices needs more careful computation, taking into account the inventory total during various periods of the year.

The relationship between inventories and gross sales in an evenly balanced business should be fairly stable.

Similarly the ratio between inventories and gross profits should be relatively steady.

Good management warrants the adoption of inventory and purchasing control plans and comparative records of measurement as means of maintaining a healthy balance.

But common sense in the use of the system is even more important than theoretical perfection of the system itself.



auditing department on verification of prices and terms; and with the stores department on disposals of obsolete or unusable material.

Operating on Carefully Planned Schedules

Industrial managers have begun to realize that a large percentage of the waste in industry is caused by the lack of effective coordination and control plans for the business as a whole. The tendency now is to work on a basis of carefully planned schedules. Naturally, production and hence material requirements, should be based on the market condition of the product, and these requirements should be determined well in advance, so that the production and purchasing departments will have ample time to prepare for the fulfillment of their schedules. The starting point for these schedules is in the sales department where a careful analysis is made of the sales possibilities for the subsequent period, and from this analysis the sales quotas are set.

The length of these schedule periods depends upon the distribution and manufacturing conditions of the industry and may vary in length from one month to a year. The sales schedule, when completed, is submitted to the production department, where preparations are made for the manufacturing of the specified number of units in the specified time. The material requirements for this production program are determined and purchase requests written for any necessary additions of materials, together with a time

(Concluded on page 1821)



Money Savers in Modernized

FOUNDRIES have been studying their costs closely during the past year and have taken an unusual interest in new labor-saving equipment and in better foundry practice, according to William C. Wright, manager of the service department of the National Founders' Association, who has spent most of the past 20 years traveling from one foundry to another and in assisting the association members with their problems. At the recent meeting of the National Founders' Association in New York, Mr. Wright presented lantern slides of some of the striking developments he has encountered in various foundries. A few of the more interesting views accompany this article.

"As a general thing," said Mr. Wright, "our foun-

A CONVENIENTLY-ARRANGED storage room for core boxes, with core ovens at one end. Room is equipped with hand-lift trucks.



dries run along on an even keel, and then, suddenly, without apparent reason, they begin making more scrap than a half dozen foundries ought to make. At such times, a man from the outside who is familiar with foundry problems can frequently locate the condition that has crept into the work and is causing most of the trouble. The foremen are so close to the job that they go by the problem without even seeing it. An outsider, on the other hand, takes nothing for granted, and, by questioning each step of the process, is very likely to discover where the practice differs from the standard, and, by advising the proper correction, causes the difficulty to disappear.

"Perhaps a new pattern has been put on a molding machine. When hand molded, the piece gave no trouble, but a machine job has different gating, different sand, different ramming, different pouring, and, owing to these differences, the job runs at a large loss. That condition is encountered again and again.

Undue Shrinkage Frequent Trouble

"Probably the trouble met with most often is undue



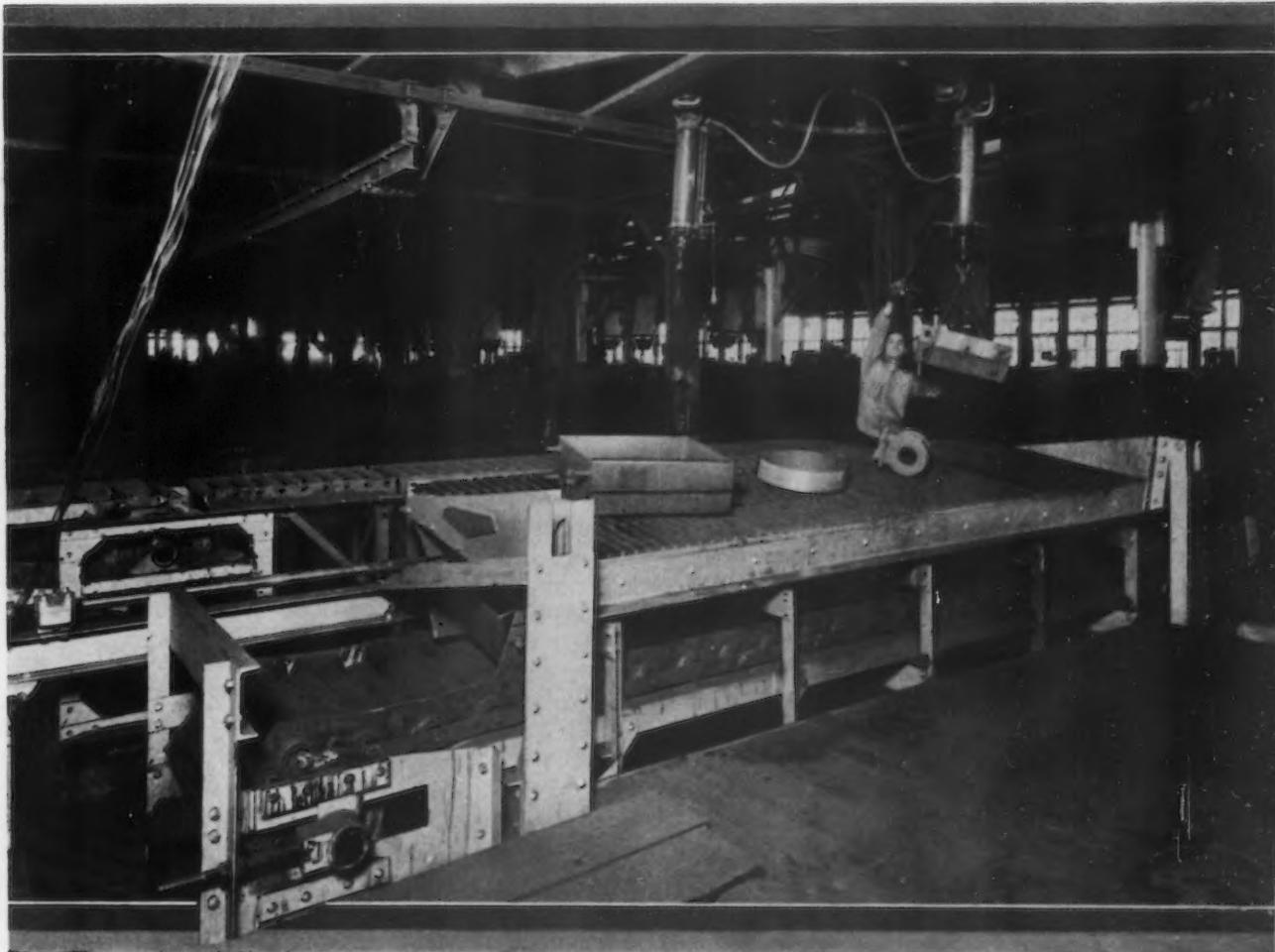
Foundries

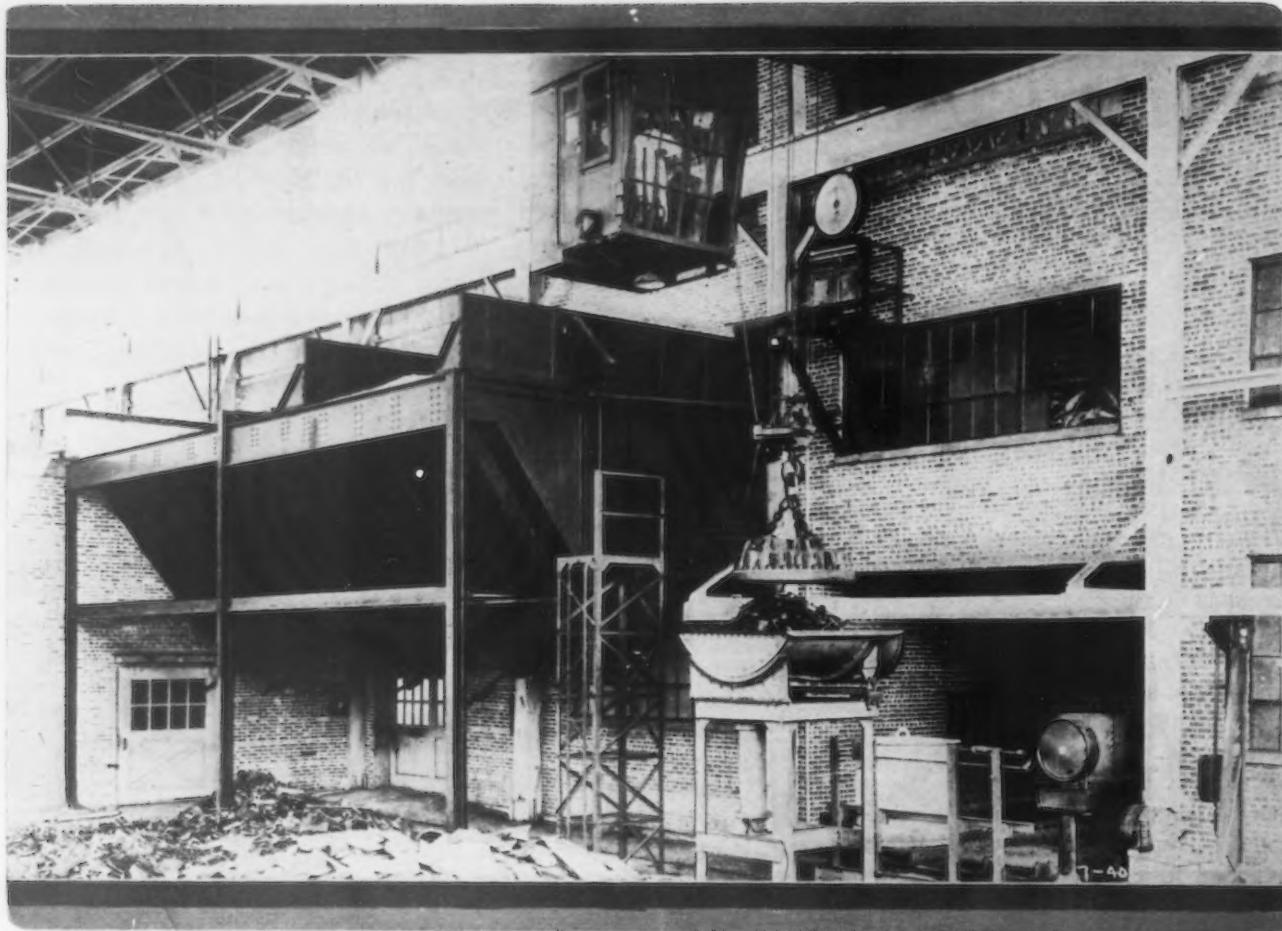
shrinkage. The pattern, being improperly proportioned in the first place, has caused loss to attend its use from the start. Owing to faulty proportions, the foundry has been working against the laws of nature and is trying to make solid castings regardless of the design. If we could only make engineers understand the importance of uniform sections, especially where two sections come together, a great step forward would be made. Often, from one cause or another, the design cannot be changed. The foundry then must find some other way to overcome the shrinkage. Making a low phosphorus iron casting from low phosphorus pig iron, a malleable pig and steel scrap comes as near overcoming the trouble of undue shrinkage as anything I have seen. By low phosphorus I mean as low as 0.16 or 0.18 per cent. Then keep the silicon as low as machinability will permit. Gating, of course, has a great influence, also the pouring temperature, but most foundrymen understand these. I have helped many foundries out of shrinkage trouble by advising them to use a low phosphorus mixture.

THE National Founders' Association, through its service department, has been studying the methods which modern foundries have adopted in the cutting of production costs. Mechanical charging of cupolas, mechanical conveying and better methods of sand preparation are among the practices that are finding wider favor.

It seems well established by those who have gone into synthetic sand that it has qualities which make it far superior to natural molding sand. First, the fineness of grain can be kept constant. That is, once having determined the size grain best suited to the work, silica of that fineness can be purchased, and, since the sand is tested often, the fines as they accumulate can be eliminated.

A SHAKE-OUT grid in a modern foundry. The flask is handled by air hoist and dropped on to the grid. The sand drops through grating to a conveyor.





MECHANICAL charging is a growing factor in cutting foundry costs. This view at the foundry of the Caterpillar Tractor Co., Peoria, Ill., shows pneumatic bucket loaded used to fill charging buckets.



"In natural deposits of molding sand, the finest is on the top of the bank just beneath the soil. As the men work from the bottom of the cut, every little while the bank slides down and more or less fine sand becomes mixed with the coarser and is shipped in that way; so frequently one gets small quantities of No. 0 among the No. 4, which can cause a lot of trouble.

"Nearly the same condition is true of the bond. In nature, the bond differs in different deposits, and unless one lives close to some deposit he can never be sure the sand he receives comes from one bank. In synthetic sand you have no trouble in keeping the clay bond up to any required standard. Moisture is the most important of all. Where the molder tempers his sand, or where a night gang is employed, the molder finding his heap too dry stabs over the heap and adds moisture by guess. Or, he may have a cope drop out, and, knowing that the quickest way to increase bond is to add water, he does so, while as an actual fact the heap is moist enough as it is, but lacks the clay bond. In synthetic sand, the bond and moisture content can be kept easily in the right proportion.

"There are on the market simple machines to make

and handle synthetic sand, and it is a question for you to study in regard to your own foundry as to whether there is anything advantageous in the proposition for you. Do not forget that synthetic sand gives better surface to the castings, and so cleaning costs are lower; also, there is less new sand used. Look around your town and see if you can find close by a supply of silica which will answer to make molding sand from. You may find an item which can be turned into a source of profit."

I want to give you word for word just what a member company has to say about its experience in sand control.

Experience in Sand Control

SOME 10 years ago we began the study of our molding sand situation. Our city has a very unfavorable freight rate and this naturally imposes an additional cost upon the price of the sand as mined, which is quite material. We figure our sand at \$7 per ton, made up as follows:

Sand f.o.b. banks.....	\$1.50
Freight	4.10
Handling, etc.	1.40
Total	\$7.00

It is necessary to recognize that in many sand conservation programs, the real cost of the sand is not only the cost of new sands f.o.b. banks, but price f.o.b. plus truckage and dumpage charges. The situation applies equally as well to sea-coal, where here we



have the present price of some \$15 per ton, \$6.10 of which is actual freight. To this there should be properly added truckage to bin and storage and truckage to foundry, and, of course, a similar charge for dumpage as compared to sand. This would, therefore, properly fix a price of approximately \$17 per ton for sea-coal.

Our early work in the testing of molding sands was primarily for the purpose of obtaining a greater knowledge of the sand characteristics. That is to say, new sands as purchased and heap sands or facings as used in the foundry.

Beginning, of course, with the formation of the joint committee on molding sand research of the American Foundrymen's Association in 1921, industry was given the tools in the way of standard methods and technique to still further carry on sand testing. Our early work up until about 1925 consisted primarily in an endeavor to purchase the molding sand best suited for the work at hand through means of specifications and close cooperation with the producer.

Our sand testing likewise was used for the purpose of developing a greater knowledge of the physical characteristics of the sand as actually used in the foundry. The tests employed in the examination of the new sands consisted chiefly of the moisture and fineness tests, together with the dye absorption test for determination of quality of clay contained. The control tests consisted principally of the Doty tests for strength, permeability, moisture and mechanical analysis or fineness test.

The use of sand testing naturally developed greater

CONVEYORS facilitate rapid handling of work when arranged, as in this plant, to carry molds away from each molding machine.

knowledge of our sand requirements and thus indirectly permitted us to reduce our over-all sand costs by the selection of the best sand available for the work. It was not until about 1925 that our work of conservation began in earnest. We had previously and do now consider the question of the quality of castings produced as paramount and any conservation or saving in new material as entirely secondary.

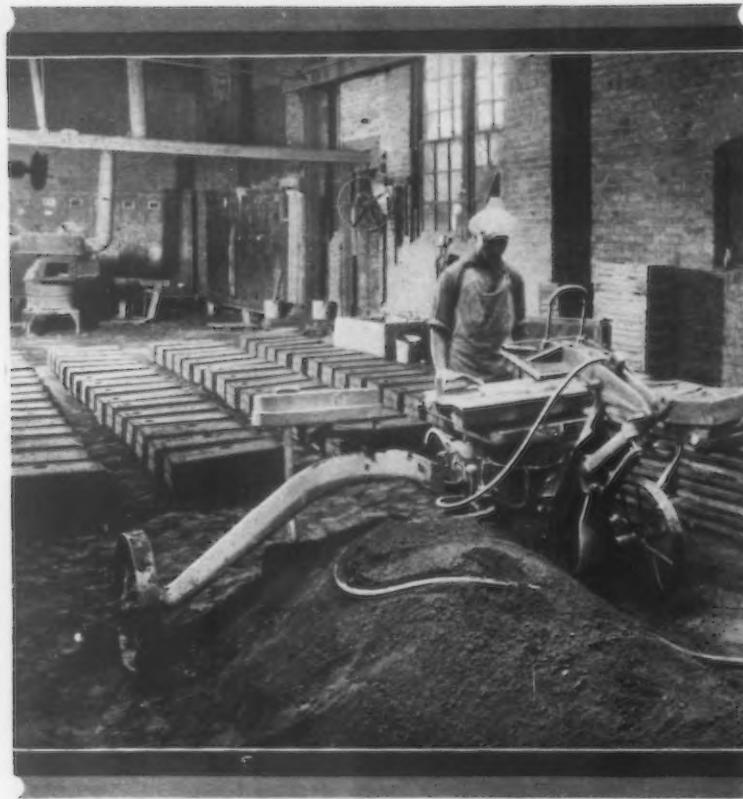
In 1925 the study of the use of clay bond was undertaken. The merit of clay bond was soon recognized and gradually molding sand was replaced by clay bond. In recent years the more colloidal type of bond from Wyoming has been employed with continued success.

As indicative of the actual saving that has been accomplished in the amount of new material employed, there is shown a comparison of the old with the new. This comparison involves typical green and dry sand molding heaps.

OLD GREEN SAND MIXTURE

Cost per ton of mixed sand

25 per cent gravel at \$7 per ton.....	\$1.75
3 per cent sea-coal at \$17 per ton.....	0.51
Total	\$2.26



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SAND preparation is increasingly recognized as an important factor in saving money in foundry operations.
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lightly faced presents an entirely different problem from a casting cylindrical in shape, poured on end at a high temperature in which the job cannot be faced, and must therefore employ a heap of facing quality.

It is to be appreciated that all of the conservation and sand saving that has been accomplished has been brought about without the expense of elaborate or additional sand-handling equipment. The equipment in use consists of the Simpson muller for certain types of work, the Auto-sand cutter and standard mixer for other types.

You will note in the case of the sand mixtures of present date, the relatively small per cent of sea-coal. This, of course, is explained by the fact that less new sea-coal is necessary due to the lessened amount that is wasted, when only some 6 per cent of the total heap is placed upon the dump as compared to 28 per cent.

Savings in Mechanical Charging

Another place where many firms are making a nice saving is in the use of mechanical chargers. For some years the emphasis in saving has been put on mechan-

PRESENT MIXTURE

Cost per ton of mixed sand

4 per cent gravel at \$7 per ton.....	\$0.28
3/4 per cent sea-coal at \$17 per ton.....	0.13
1/2 per cent Bentonite clay at \$35 per ton.....	0.17
Total	\$0.58
Saving per ton of sand mixed.....	\$1.68

OLD DRY SAND MIXTURE

Cost per ton of mixed sand

25 per cent gravel at \$7 per ton....	\$1.75
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PRESENT MIXTURE

Cost per ton of mixed sand

2.4 per cent gravel at \$7 per ton..	\$0.17
0.7 per cent Bentonite at \$35 per ton	0.25

Total	\$0.42
Saving per ton of sand mixed..	\$1.33

Recognizing that any figure of sand conservation or saving based upon a per ton of castings basis would not give the true picture, the above figures are given on the relative costs of the sand mixture as applied in the foundry. This should be entirely clear when it is realized that a 500-lb. casting made in a shallow flask

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A MOLDING station in the brass foundry of the Pittsfield works, General Electric Co., showing three tracks for conveying of the molds.
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A SHAKE-OUT station in the brass foundry of the Pittsfield works, General Electric Co.

ical molding. Lately, some firms have found it is possible to make a considerable saving in their non-productive payroll.

Getting the iron onto the scaffold and charging it into the furnace has always been a very laborious job when done by hand. Today machines do that work so well they reduce costs very materially.

Another development which has attracted my attention, and which, so far as I can learn, is a money saver as well as having many other features of excellence, is the Barrett fixed carbon fuel process of melting bronze or red brass. This process, however, is not recommended for compositions containing over 10 per cent zinc. That is an important fact to keep in mind.

The outstanding features of that process are noticeable as soon as one steps into a foundry where it is in use. First, there is no noise. If you have been around a brass foundry using oil as fuel, you will appreciate that change. Second, there are no fumes from the melting furnace. Think what that means to the men! Third, very rapid melting—a 500 to 600 lb. heat every 15 min. Fourth, the ease and efficiency with which borings are melted. Fifth, no skilled melter required. Sixth, the absence of excessive heat from the furnaces. Seventh, the excellence of the product. Those holes so prevalent in castings made by the old process are entirely absent from castings made this way. I have looked over many piles of machined castings made by this process and have never discovered a gas hole. When you think of those advantages, together with

ELECTRIC tram carries buckets along material yard of foundry. Tracks on which tram runs are in a slight gulley, which facilitates easy loading of the charge.

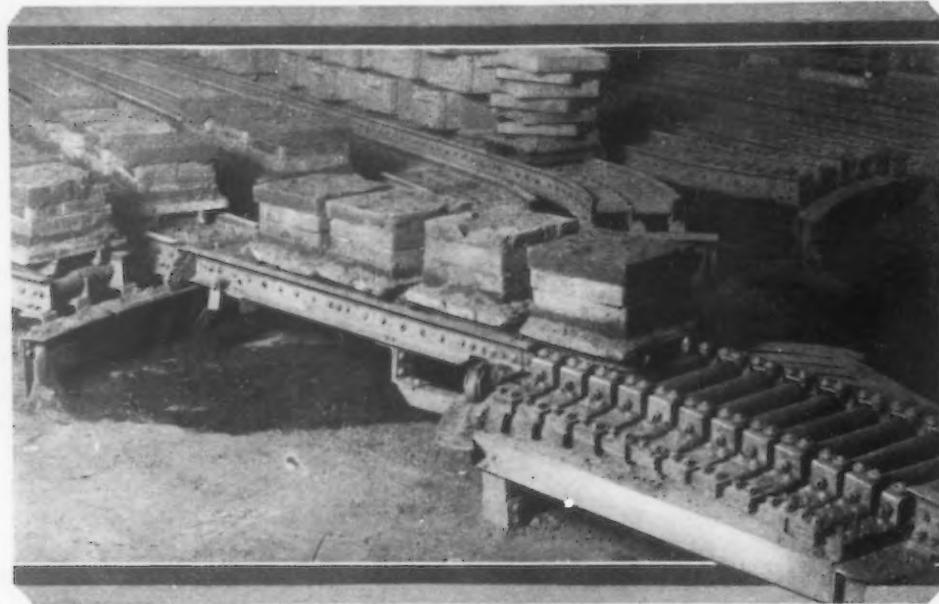
a melting cost of from \$5 to \$6 a ton, including metal loss, you can see what the process offers. If you are melting much bronze, I believe it will pay you to investigate.

Foundry operations consist largely in conveying material from place to place, so when you start to cut costs in your foundry look at the conveying of pig iron, sand, scrap, the finished castings to the mill room, then moving the castings about the cleaning room to the grinders and chippers. You are all familiar with the gravity roller conveyor. Many jobbing foundries can use this type of conveyor to a greater or less extent and save money.

Accuracy in Investigations Sorely Needed, Says French Authority

IN addressing the Association Technique de Fonderie, Paris, recently, A. Portevin criticized severely some of the methods adopted in metallurgical analyses and experiments. These methods often





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CONVEYING
system in Pitts-
field brass foundry
of General Electric
Co. is equipped with
switch for trans-
ferring molds from
storage lines to
pouring lines.
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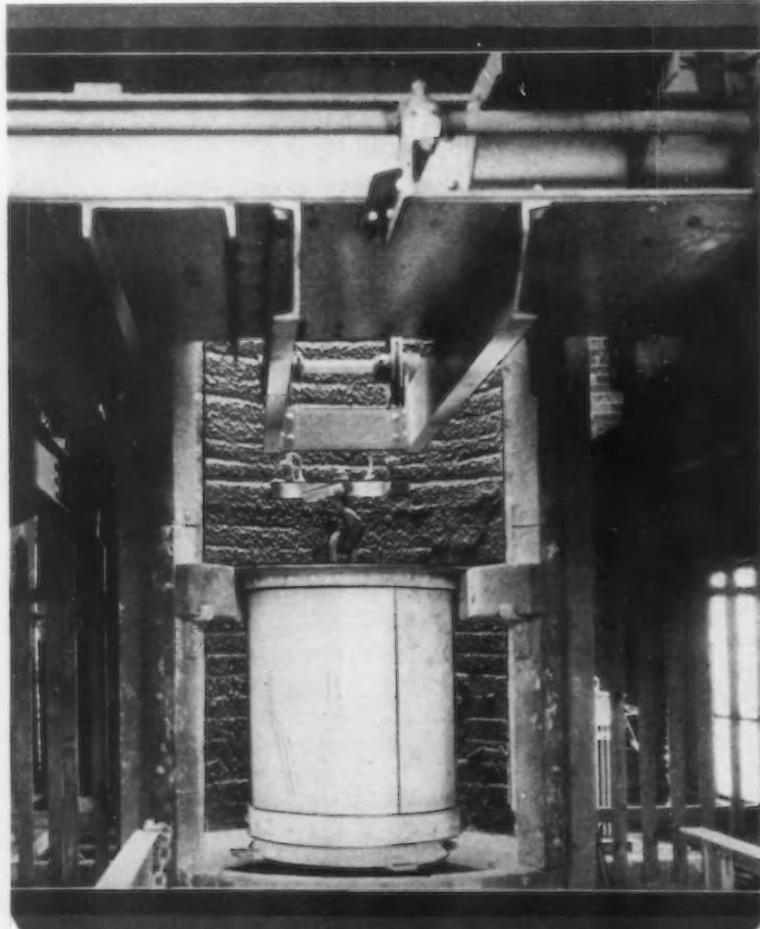
show an incomplete and inaccurate knowledge of what has already been published in France. It is a waste of time, he said, to multiply investigations in order to arrive at a result already known. When the results of experiments are inaccurate, as is frequently the case, positive harm is done. He cited one or two examples.

Tests for elongation, for instance, are frequently carried out under conditions which preclude the possibility of correct results, and yet these are often published to three or four decimals.

Investigations are often made with iron castings in which the elementary fact is overlooked that two castings from the same melt may show, under different conditions of cooling, as much heterogeneity as if poured from totally different qualities of iron.

Such labor would be more fruitful if directed solely to the perfecting of the testing apparatus and the mode of operation, for if it is desired to experiment within the limits of techniques and science, it is indispensable to conform to the exigencies of scientific accuracy. Above all, it is necessary to refrain from allowing the results of inefficient experimental work to find their way into public meetings and the press, for such carelessness and incompetence create doubt as to the sincerity of the investigator.

other secret and mysterious proceedings. They expect to receive from the scientist a magic wand which will enable them, without any effort on their part, to obtain large profits. This is a baseless and unfair conception. The object of scientific research is to discover the factors or variables of each phenomenon, to find means of measuring them, and to attribute to them their proper value. There is no foundry which turns out only bad castings; such an enterprise could not continue.



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THIS type of charging bucket is
equipped with cone-shaped bot-
tom, making for easy dumping and
discharges the material to be melted
at the outside walls of the cupola.
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How Quenching Media Affect Corrosion of Alclad Sheets

RESISTANCE to corrosion of duralumin sheet is greatly influenced by the quenching medium used in heat treatment, or, more specifically, by the rate of cooling during quenching. On the other hand the tensile strength, yield point and elongation are only slightly affected by the quenching medium.

It is customary to specify that duralumin be quenched in cold water when the parts are to be exposed to the action of moisture, as in naval aircraft. These parts are frequently heated in a molten bath of sodium nitrate, prior to quenching. Water readily dissolves any adhering salt, whereas oil does not. It is impracticable to heat large parts or those of bulky or irregular shape in a molten salt bath because of the severe distortion which occurs when work is lowered into and raised from the bath. Salt baths also have limitations, for other reasons. Therefore, much duralumin is heat treated in electric furnaces of the oven type.

Quenching in oil, such as is ordinarily used in the heat treatment of steel aircraft parts, results in much less deformation than quenching in water. Moreover, electric furnaces that are used for heat treating steel parts may be used for the treatment of duralumin, provided temperature regulation and uniformity are satisfactory. Such furnaces are usually provided with tanks for quenching in oil, as oil is considered the preferable medium for quenching steel aircraft parts. The moderately increased susceptibility to corrosion following oil quenching as compared with cold-water quenching has hitherto been an argument against this practice.

Alclad sheet has been developed since the date of the discovery of the variation in corrosion, following various quenching treatments. The sheets consist of ordinary duralumin, carrying on its two surfaces a thin layer of aluminum of high purity. This aluminum is alloyed with and firmly attached to the duralumin. It has a relatively high resistance to corrosion and there-

CORROSION of duralumin sheet is decidedly influenced by the quenching medium used when heat treating it. Other properties are also affected. What is the situation regarding Alclad sheets, which are duralumin covered with aluminum? The author of this paper answers this question,—Alclad sheets are much less affected by the quenching medium, particularly with reference to corrosion resistance. This article is a part of a paper "Quenching of Alclad Sheets in Oil," by H. C. Knerr, Philadelphia, read by him at the National Metal Congress in Chicago this fall.



fore acts as a protective coating for the duralumin.

As the resistance to corrosion of Alclad sheets depends upon the surface layer of the aluminum, and not upon the character of the internal duralumin, it is to be expected that no such difference in resistance to corrosion, after treatment in various quenching media, would be experienced as is characteristic of duralumin.

Tests have been carried out for the purpose of obtaining information on this point.

A series of standard tensile tests specimens having a gaged section $\frac{1}{2}$ in. wide and 2 in. long were cut from an Alclad sheet and from a duralumin sheet, both $\frac{1}{16}$ in. thick. All were heated to 930 deg. Fahr. in an electric muffle furnace, held for 20 min. and quenched in various media. After aging, these specimens were exposed to corrosion by the alternate immersion method in a 20 per cent solution of salt water containing a small percentage of hydrogen peroxide. The specimens were immersed in the solution for 1 min. and then raised to allow them to dry in air for 14 min. The peroxide was renewed twice a week.

Corrosion was continued until bent tests made on the butt end of duralumin specimens showed pronounced brittleness. This period of corrosion, 400 hr., did not greatly affect the tensile strength of any of the specimens, but did show a pronounced influence on the elongation. The latter is regarded as an excellent comparative measure of this type of corrosion. The percentage of elongation of duralumin was characteristically reduced in the specimens quenched in oil and in still air, but the elongation of the Alclad specimens varied little with the quenching medium and was fully as good for oil quenching, either hot or cold, as when quenching in cold water.

Specimens of each type were tested without exposure to corrosion, having been quenched in cold water, and showed normal characteristics. These tests

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Ford Makes Substantial Saving by Producing Own Push Rods

By BURNHAM FINNEY

Detroit Editor, *The Iron Age*

SAVING a penny, nickel or dime in the cost of making an automobile may seem insignificant. Yet when small economies are multiplied in the production of thousands of cars a day, the result runs into millions of dollars in a year. It is the little savings, the daily development of some new and better way of doing a job, that make possible the periodic reductions in Ford car prices, the increasing of wages and the constant improvement of the car itself. Quantity output alone, according to Ford officials, could not do it.

In the plants of the Ford Motor Co. the employees, from the highest officials to the more progressive of the machine operators, are always trying to improve methods of manufacture. True to the Ford idea that nothing is permanent but change, they cast precedent to the winds. Because a thing has never been done before is no reason why it should not be done now.

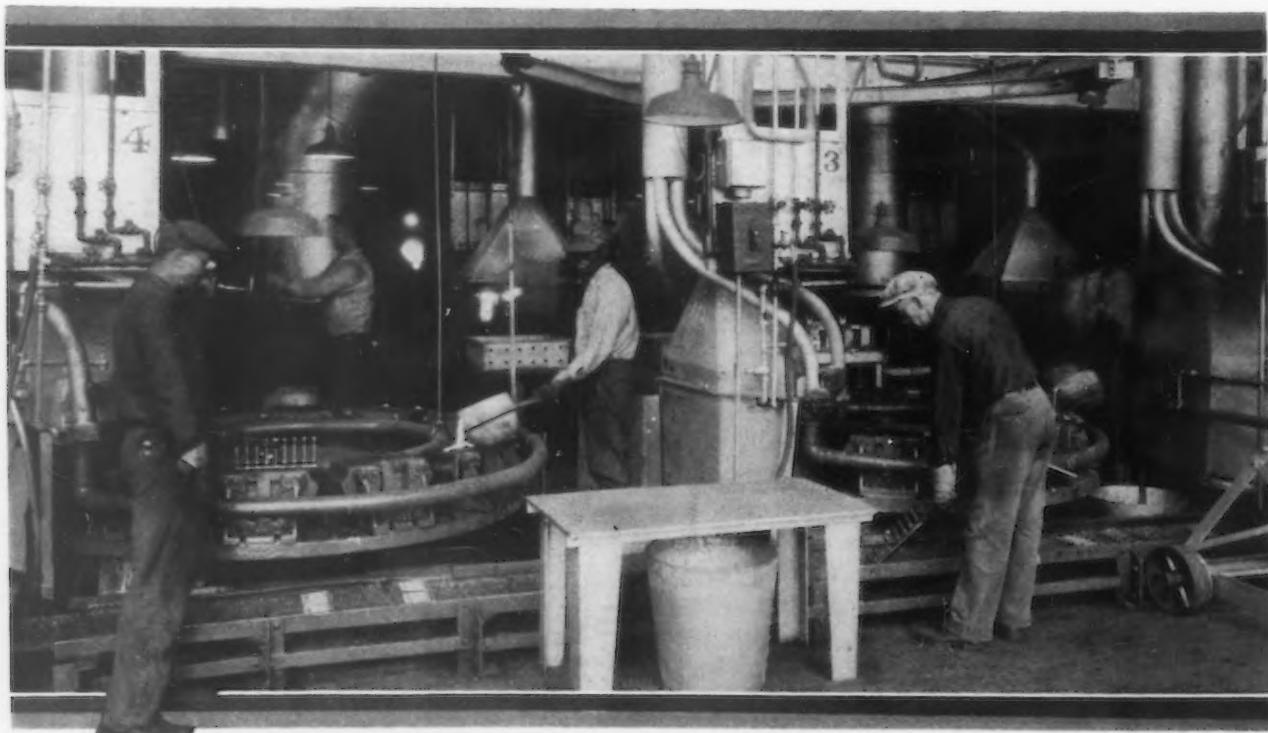
A good example of how

this belief is put to practical use is the production of push rods. Made in two pieces with heads of chilled iron, they formerly were purchased from other concerns. However, Ford engineers recently developed a new iron and push rods now are manufactured in one piece at the Rouge plant, with the result that they give better service at a cost of 1.46c. less per rod. Since there are eight rods to a car, the total saving for each car amounts to 11.68c.

Gray iron from which push rod castings are made is of the following analysis: Silicon, 2.50 to 2.70 per cent; sulphur, 0.10 per cent maximum; phosphorus, 0.30 to 0.40 per cent; manganese, 0.60 to 0.80 per cent; and carbon, 3.30 to 3.50 per cent. The dies into which the hot metal is poured are made of the same material.

Push rod castings are produced on a Ford-built rotary die casting machine, consisting of 12 dies with eight castings in a die. Machine has two operators, one pouring metal and the other brushing dies and knocking out cooled castings.

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IT is the constant development of new and better ways of doing a job that makes possible periodic reductions in Ford car prices, increased wages and improvement of the car itself. Quantity output alone could not do it, say Ford officials, who add that "because a thing has never been done before is no reason why it should not be done now." The manufacture of push rods at the Rouge plant, described in this article, is an example of how Ford has cast precedent to the winds in order to achieve new economies and higher efficiency.

chine's capacity is 11,000 castings in an 8-hr. day. Rotating every 3 min., the machine has two operators, one pouring the metal by means of a hand ladle and the other brushing the dies to keep them clean and also knocking out the cooled castings on to a wire belt conveyor. The dies are protected by an acetylene soot so that the hot iron flowing into them does not burn them and castings do not stick.

Moving on the machine a distance of about 10 ft., the castings are removed by a workman operating a power press, which knocks off the risers and likewise automatically ejects the castings into a metal basket. From this point the castings are taken to an automatic, pusher-type, gas-fired annealing furnace, where they remain for 2½ hr. They are at a temperature of 1615 deg. F. for 30 min., after which they slowly cool to 900 deg. This brings down the Brinell hardness from 241 to 179.

Castings then are taken to the foundry tumbling department to be cleaned. This operation is followed by a general foundry inspection. After the rods have passed the inspector, they move in small metal trays by motor truck to the machining department.

Rods Machined on High Production Tools

Rods are rough-ground on both ends on an end-grinding machine which turns out about 1200 rods an hour. Next is a rough body grind on a centerless grinder equipped with a special hopper feed. Production of this machine is 1600 an hour. From this point the rods pass to a special automatic Ford-built machine which chamfers the ends and drills the centering holes. All the operator does is to feed the rods into the hopper of the machine, which has a capacity of 1600 rods an hour.

In order to lighten the weight of the rod, a hole 5/16 in. in diameter is drilled through the center from the head of the rod to within a quarter inch of the bottom. This work is done on a rotary drill equipped with an automatic feed. The next operation is drilling a hole 1/8 in. in diameter in the side wall of the push rod near its end. This hole is for the insertion of a pin so that the push rod can be held clear of the camshaft.



Push rods are twice given a sound test to detect cracks. In this process inspector drops rods on to steel block, telling by sound of impact whether they are cracked.

The push rod passes through a conveyor-type washing machine and thence to a pusher-type, gas-fired, heat treating furnace having a temperature of 1580 deg. F. After remaining in the furnace for 30 min. and at heat for 10 min., the push rods are quenched in oil by dropping from the conveyor as they reach the end of the furnace into an oil tank. In the oil tank the push rods fall on to a wire basket conveyor which carries them up out of the tank at approximately a 45-deg. angle and discharges them through a chute into a basket. In this heat treating process the hardness of the push rods is changed from 179 Brinell to 45 to 50 on the Rockwell C scale.

Rods Are Hammer Tested

Push rods are tempered by passing through a conveyor-type draw furnace, in which they remain at a temperature of 400 deg. for 1 hr. They then are checked for hardness on a Rockwell hardness tester. Moving to a special Ford machine, they are given a hammer test which determines whether any heat cracks have developed in the heat treating process. This machine tests 2500 push rods an hour.

After push rods have been found free from cracks, they are finish ground on two centerless grinders, the first taking off 0.003 to 0.004 in. from the surface and the second machine from 0.001 to 0.002 in. This is followed by grinding both ends of the push rod on a special grinding machine. The rods are cleaned by passing through a conveyor-type washing machine, from which they go to an in-



spector for a drop test. In this process the inspector picks up the push rods by hand and drops them on a steel block, telling by the sound of impact whether they are cracked. The manufacturing process is completed with the polishing of the rods on a buffing machine.

From the buffing operation they are carried to the inspectors nearby, who examine them for length (limit of 0.001 in.), diameter of the body (limit of 0.0005 in.) and squareness of the head with the body (limit of 0.001 in.). As a final precaution they are given a second sound test to detect cracks. From the inspection tables they are transported to the motor line to be assembled.

▲ ▲ ▲

ENDS of push rods are chamfered and centering holes drilled on special automatic machine with hopper feed.

* * *

AFTER final machining operation, push rods are inspected for length, diameter of body and squareness of head with body.

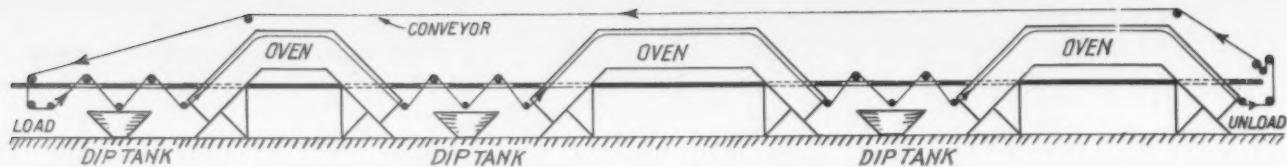


1762—*The Iron Age*, December 11, 1930



NEW YORK'S CHANGING ARCHITECTURE

A PHOTOGRAPH taken from the top of the new Chrysler Building in New York shows the prevalence of the set-back type of architecture in the newer buildings. This is to conform with New York's building code which prescribes the height that buildings may be built straight up according to the width of the street on which they face. The set-back permits taller buildings than would otherwise be possible and provides for better light and air.



Dipping and Baking Three Coats of Japan in Continuous Unit

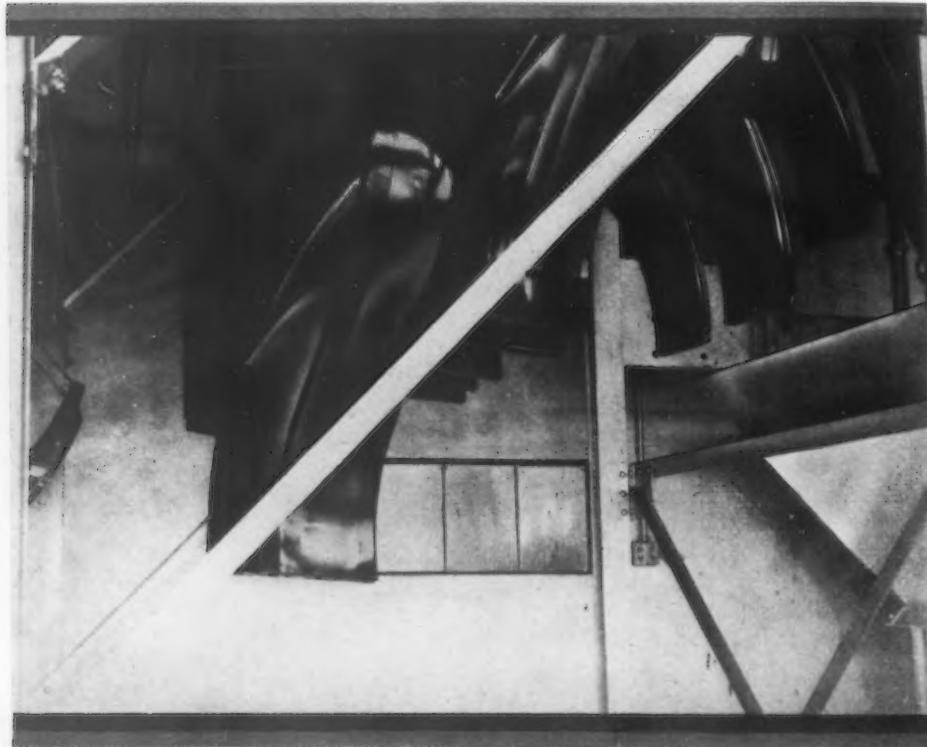
By J. B. NEALEY
American Gas Association, New York

AN interesting installation for japanning, in which are incorporated several unique features, has been made in one of the large automobile plants. The setup is continuous and automatic in operation, three coats being applied and baked in three gas ovens, with the use of but one conveyor.

This installation was made at the plant of the Hupp Motor Car Corp., Detroit. It includes three bake ovens and three dip tanks, the former housed in a building erected on the roof of the main factory and the latter on the top floor. The separate units are placed in a single straight line, so that the one

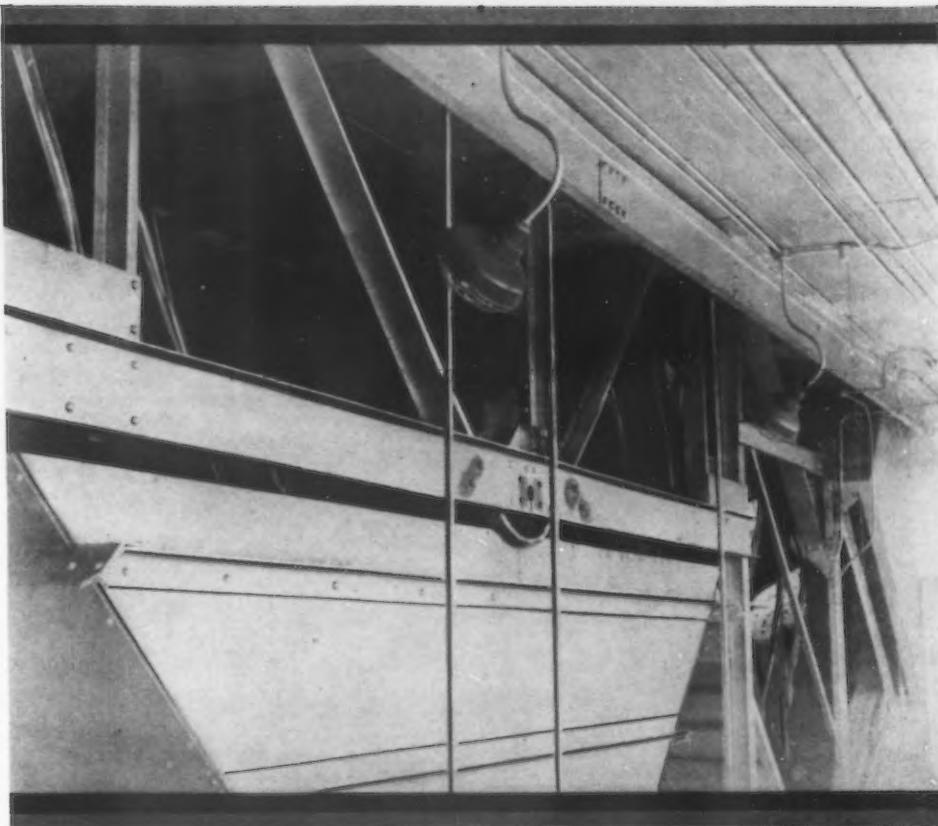
traveling conveyor serves them all without any change in direction in the horizontal plane. In the vertical plane, however, this conveyor travels up through the roof to the gas ovens, returns below to the dip tanks and repeats until the cycle is completed.

Along the line of travel of this conveyor and directly beneath the ovens, this section of the top floor is divided into eight sealed rooms, the partitions being of the same construction as the building proper, brick and concrete. The first and last rooms are used respectively for loading and unloading the conveyor, while the second, fourth and fifth contain the



FENDERS on conveyor emerging from first bake oven, at left, and about to be dipped, for second coat, in tank just showing at right.

TOP of V-shaped enamel tank, with fenders on conveyor dipping for second coat of japan.



dip tanks. Cleaned and filtered air is blown into these rooms and just enough air pressure maintained within them to prevent the infiltration of outside air containing dust, dirt, etc. This protects the quality of the coats of japan.

Work Gets Three Coats Without Leaving Conveyor

BLOWERS and air conditioning equipment are located in rooms 2 and 6. Fire prevention apparatus, consisting of batteries of carbon-dioxide tanks, is placed in room No. 5. Piping connects these safety tanks with the various sections of the installation. Fusible links are placed at key points throughout the system and, should the temperature in any section rise above a predetermined degree, the carbon dioxide would be released and immediately flow to the affected section.

Made up of two parallel chains, between which rods are suspended, the conveyor is operated by a motor located close to the unloading end. By controlling the speed of this conveyor, through a speed-reduction gear train, the baking periods are regulated within any time limits specified. The work is hung on to the conveyor and never leaves it until it is unloaded; finished. During its travel it receives three coats, priming, rubber and finish, each coat being baked

separately in a different oven, and at approximately 450 deg. F.

Heating of the ovens is accomplished indirectly, each being supplied with a separate air heater (two, in the case of the last oven), which are fired with gas. The ovens are of the A-type and constructed of sheet steel.

Each heater consists of a single sheet steel shell, into one end of which fires a single gas burner which is provided with a gas-air proportioning device, so that the atmosphere of the ovens can be regulated. On the opposite end of the heater is a motor-driven fan which blows the heated air into the oven.

To obtain fuel economy about 90 per cent of the waste heat of the oven is blown back to the heater, mixed with a certain amount of the fresh air, and recirculated in the oven. This is taken off at the point of greatest volatilization, just above the exhaust duct. The rest of the waste heat in the oven is vented to the outside of the building through an exhaust duct located in the first leg and just below the roof line.

As the hot air for baking is forced in at a point on the second leg, the heat flows counterwise to the movement of work. This principle effects another economy in fuel, as the cold work is preheated by

THREE coats of japan are put on fenders and other parts, with intermediate baking, without leaving the single line of conveyor in the Hupp plant. The dipping is done on the top floor of the building and the baking in a structure erected on the roof. The tanks and ovens are arranged in a straight line, the conveyor traveling alternately down into a tank and up through a gas oven until the cycle is completed. The entire process is under both mechanical and temperature control, so that best results may be achieved.

some of the waste heat which is being exhausted.

These ovens are equipped with temperature controls which work automatically through motor-operated valves in the gas supply lines. When the temperature rises to above a predetermined setting the valve closes, but enough gas passes through a bypass to keep the pilots going. When the temperature drops the valve reopens. All pilots are supplied with spark plugs operating intermittently.

Accident prevention devices include solenoid valves in the gas supply lines to the heaters, which

over the bottom one, to a third, directly in line, horizontally, and about 5½ ft. distant. This short horizontal run of the conveyor is used for loading, the operator standing beneath and hanging the work on to the conveyor rods as they pass.

From this third sprocket it requires three turns more to traverse the first tank, raising the work over the end, dipping down into the tank and raising it out again. The line of travel from a high sprocket to a low, and vice versa, is at an angle of 45 deg.

As the conveyor rises out of the tank over the



END of enameling line. Fenders have just emerged from last bake oven and are about to be taken off for inspection.

automatically close and shut off the gas flow if, for any reason, the blower fan motor should fail, or the temperature of the oven suddenly rise above the upper limit of the control setting. All of the motors are operated through a central control switch which is interconnected with the fire extinguishing apparatus. This switch is automatically pulled when the flow of carbon dioxide starts.

Entire Equipment in 400-Ft. Area

THESE ovens and tanks occupy a space about 400 ft. in length, the first oven being 52 ft. long and the other two 87 ft. each. The approximate width of all of them is 12 ft., while the distance from top to bottom is about 9¾ ft. The bottom of the upper sections of the ovens is about 20 ft. above the floor on which the tanks set.

The dip tanks are of steel and V-shaped, the tops being 19½ ft. and the bottoms 3½ ft. long. They are 8 ft. deep.

The conveyor is a closed loop. It takes the work through the tanks and ovens, returning over the tops of the ovens to the loading end. Here it rides down over two sprockets, one directly below the other and 9 ft. apart, and makes a right-angle turn

sixth sprocket it descends to another at the mouth of the first oven, then up the first leg, across the top section and down the other leg. As the work emerges the first coat has been thoroughly baked on and the parts then pass similarly into the second tank for the second coat, and so on, until the third and last coat has been applied and baked, when the finished pieces are unloaded.

Commerce Yearbook for 1930

CONTINUING the series of annual yearbooks, the Department of Commerce has published a volume for 1930. It includes 678 pages, of which the last eight pages are index. As heretofore, this volume is mainly a statistical survey of the progress of the United States in every material sense. It covers not only foreign commerce, but domestic commerce as well, the general economic position, employment, wages, prices, fuel and power, construction, iron and steel and non-ferrous metals, machinery, automobiles, transportation and communication, banking and finance, and a number of other topics.

Diagrams have been used to a considerable extent throughout the text, to show more clearly than is possible through the scanning of a table just what the relative positions of various things have been. The tables, of course, are relied upon for the precise information.

Many Factors Determine Cost of Using Welding

COST of welding was the subject of an interesting paper presented at the fall meeting of the American Welding Society by R. E. Kinkead, consulting engineer, Cleveland. He declared that the use of labor, material and overhead as a cost indicator is inadequate and, while that indicator cannot be abandoned, there is needed an additional cost indicator which is based upon the economic value of the product. This, he said, is particularly true of welding.

Welding, in the opinion of the author, holds out a promise of important cost reductions. Determination of welding costs would be comparatively simple if there were only one welding process instead of ten well-defined processes which produce widely different results in the physical behavior of the welded product. The situation is further complicated by claims of sellers of welding equipment and supplies.

To bring out the fundamental problems in connection with cost estimates and to prove his contention that the usual cost indicator is fallacious, the author took as a typical example a pressure vessel that costs the fabricator \$4,800 in labor, material and overhead. Adding 10 per cent for sales cost and 10 per cent for profit brought the sales price up to \$6,000. The vessel failed in six months and the fabricator spent \$800 in repairing it. Later it again failed and he replaced it. However, the fabricator lost a good customer. In this case the cost of the vessel was unknowable, because the loss of the customer's good will could not be estimated in dollars. On the other hand, the cost to the buyer was probably far in excess of \$6,000 because of loss in production. Labor, material and overhead failed as a cost indicator both to the manufacturer and buyer.

Too Much Confidence in Cost Indicator

Many manufacturers, the speaker held, are driving themselves out of business by placing too much confidence in a cost indicator based on labor, material and overhead. Some products are being made that have ten times the service life of similar prod-

IMPORTANT cost reductions in welding work are possible, says Mr. Kinkead. Usual cost indicators, based on labor, material and overhead, are not dependable. Service behavior of welded structures or products determines the economic value of the welded product. An additional cost indicator, related to the economic value of the product, is needed.

ucts made by other manufacturers, but the maker of the long-life product is basing his selling price on labor, material and overhead and comparing it with the price he estimates his competitor is able to reach, although he is producing something that has ten times the economic value of his competitor's product. Under these conditions the manufacturer who has put economic value in his product probably has no one to blame but himself if he cannot earn profits.

The author said that it seems likely that industry will operate under different conditions in the decade starting with 1930. Production capacity is 50 per cent greater than needed. The buyer's attitude is changed. Buyers more and more are requiring information that will establish the economic value of the product. The initial cost is becoming less important than the economic value and there is a tendency toward consideration of the latter rather than the former.

Life Tests of Machinery to Establish Economic Values

Economic values of products are being determined by tests under or approximating service conditions. Life tests are being run on many kinds of machinery equipment to establish economic values and to discourage the competitor who quotes a lower price on an inferior product.

When a manufacturer in the welding field makes 1000 welds that are stronger than the parts joined, it shows the quality of product is not dependent on the skill or good will of the welder. People are beginning to realize that resistance to tension loading is only one service requirement to be met in the case of welded joints. Other requirements such as resistance to corrosion, to fatigue and to too high temperatures are equally important.

The service behavior of welded structures or products in respect to these conditions determines the economic value of the welded product. Tests by Professor Moore of the University of Illinois showed

(Concluded on page 1822)

Substituting Steel for Stone on Elec

STEEL panels for mounting instruments have taken the place of slate and marble on all standard equipment manufactured by the Republic Flow Meters Co., Chicago. These steel panels, often made as large as 8 ft. wide by 12 ft. high, offer many advantages to the manufacturer, the shipper and the user. They also enhance the appearance of the completed panel, for the reason that flush mounting on steel is a practical and satisfactory job.

Slate and marble panels are subject to breakage during shipment from producer to instrument maker. These panels are easily chipped and cracked when being drilled and prepared for instrument mounting. Furthermore, slate and marble panels offer the disadvantage of producing abrasive dust when being worked, which is detrimental to delicate instruments. Finally, they are unnecessarily heavy, thereby adding to shipping cost.

Steel panels take an entirely satisfactory finish and are practically indestructible when in service and when being shipped. They are simple to manufacture and comparatively light in weight. Most plants are equipped for working in steel and are ac-

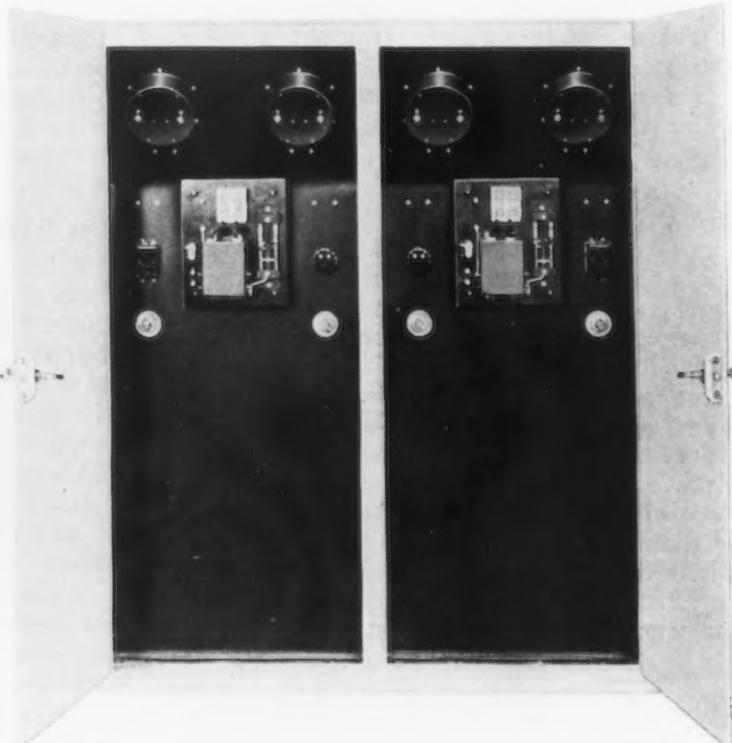
customed to do so. Hence mounting a new instrument on an old steel panel is usually a much simpler and a more satisfactory undertaking than when unskilled workmen attempt to drill and work with slate and marble.

Further, steel lends itself readily to special fabrication, such as panels with sloping benches, and as doors for inclosure of the backs of panels. When adding new panels to an old installation, steel offers the advantage that it does not have to be matched as to color and finish, inasmuch as a steel panel can be refinished at low cost at any time.

The Republic company uses steel panels from 16 in. square up to 8 ft. by 12 ft., and will build them larger, according to the needs of the user. The smaller sizes are made of No. 12 gage sheets, which are formed to give rounded edges and a flange about 1 in. deep. The corners are welded and ground to give neat appearance. Most of the smaller sizes are standard and accordingly small-diameter holes are marked from a template and punched. Openings larger than can be made on a punch press are cut by an acetylene torch, and the edges then ground and filed.



Appearance and finish of the steel panel fully meet all requirements.



Workability of steel readily lends itself to simply constructed bench-type instrument panels.

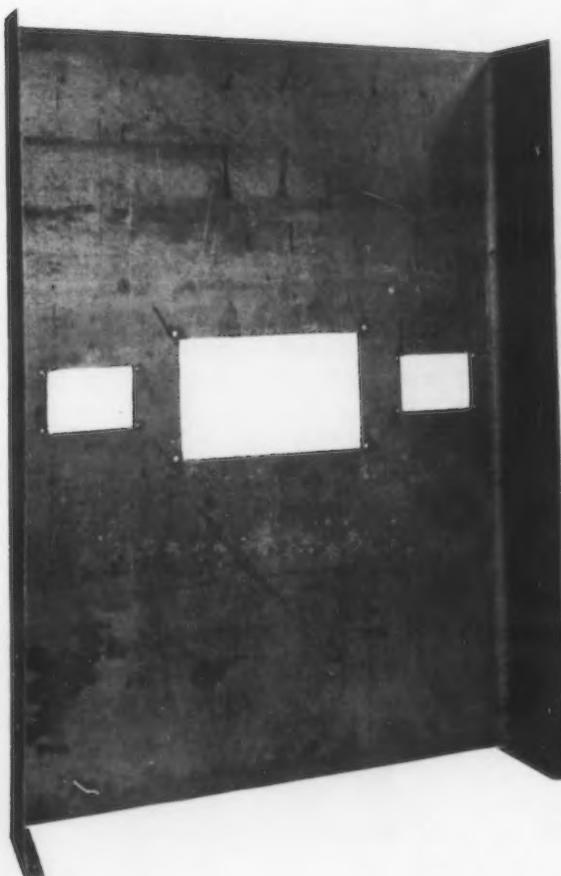
Electrical Instrument Panels

HOW IT IS DONE AND WHAT ADVANTAGES ACCRUE

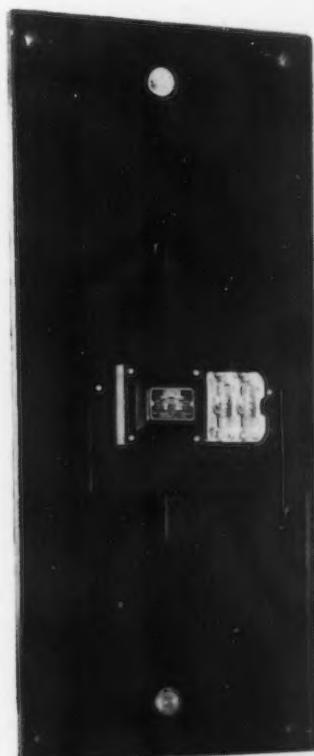


Large panels are made from $\frac{1}{4}$ -in. steel plate. The two side edges are turned back $8\frac{1}{2}$ to 12 in. to give rigidity to the panel, and angle anchor lugs are welded to the back of the panel at the floor line. Since most of the large panels are of special design, all holes are laid out from blue prints. Small holes are drilled, and large openings are cut with the torch, and the edges are ground and filed.

All steel panels are given a primer and finish coat by the spray process. It is necessary to use care to in-



Small standardized panels are laid out from templates. The holes are punched.



All four edges of the steel panel are flanged and the corners are welded and filed.

sulate the steel panel, inasmuch as on electrical instruments the voltage to the panel is usually 110, and this is stepped down to 40 volts for use in the instruments. Bakelite bushings have successfully solved this problem.

Thus another outlet for steel has been developed, to add to the myriad of small uses which, taken together, make up so impressive a total demand.

Large steel panels are made of steel plate. Large openings are cut by means of a torch.

Large Hydraulic Bending Press for German Shipyard

A MASSIVE hydraulic bending press, believed to be the largest ever constructed, has been supplied to the Deutsche Werke shipyard, Kiel, for bending heavy plates. The press was constructed for the purpose of producing a large number of parts of ingot steel, which previously were made of cast steel. It operates with a maximum pressure of over 1000 tons at a water pressure of 250 atmospheres.

The lower table has a length of 4 meters (13 ft.) and a width of 3 meters (9 ft. 10 in.). The distance between the tables is 1.8 meter (5 ft. 11 in.), and the total height of the press 14 meters (45 ft. 11 in.). A noteworthy feature of the new press is that the frame is constructed of riveted steel plates, instead of the usual cast steel, resulting in a substantial saving in manufacturing costs.

Why Thin-Walled Blast Furnaces Give Good Operation

APAPER by Dr. Jindrich Sarek, Kraluv Dvur, Czechoslovakia, entitled "What Reasons Compelled the Prague Ironworks Co. to introduce Thin-Walled Blast Furnaces," was read at the Prague (Czechoslovakia) meeting of the (British) Iron and Steel Institute.

Experiences with these furnaces over a period of four years are described in the paper. There are now four thin-walled furnaces in operation at the two plants owned by the company, at Kladno and at Kraluv Dvur.

Further, a new theory of furnace working as developed by the author a few years ago is outlined. This theory distinguishes two different modes of blast-furnace working: "internal" and "external." In actual practice fully developed "internal" or "external" modes of running are not met with, but different modifications or combinations occur.

Internal operating factors exert a deciding influence on the furnace working no less than that of the external, local factors. The resultant of all these factors, which either supplement or neutralize each other, determines which of the various modes of furnace working, which range from completely "internal" (central) to completely "external" (peripheral) manners of running, will take place.

Advantages of the Thin-Walled Furnaces

These extreme conditions of furnace working are rarely met with in a pronounced degree. The normal run usually deviates from the optimum condition toward either the "internal" or the "external" mode. Often such a run is a combination of both these extreme types, imperfectly developed.

The theory of the blast-

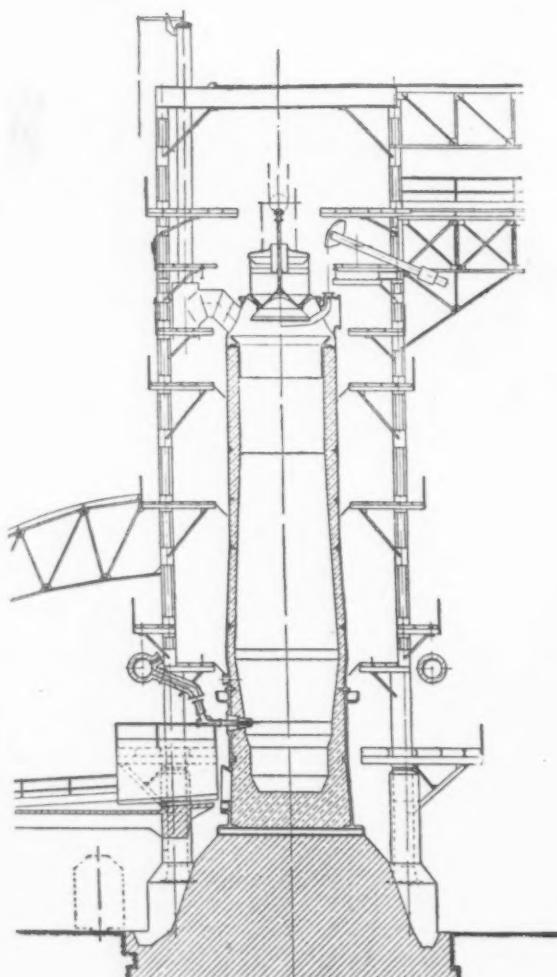
furnace working outlined in the paper gives a review of the difficulties encountered by works producing "cold" grades of pig iron from lean and acid ores. These difficulties originate from a low permeability of the stock in the lower portions of the furnace. That blast furnaces continually exhibit hanging, sticking and scaffolding, resulting in interruptions of operation and an increase of coke consumption, may be ascribed to the effect of this low permeability.

Hence, the only thing to be done is to adjust the operating factors so that the furnaces have a slight inclination toward the "external" mode of running, which is not difficult to perform on the basis of the theory. This theory becomes consequently a valuable guide in operating blast furnaces; it gives information on the mode of furnace working and so prevents many an interruption in their operation.

This theory explains at the same time why, on installing big blowers, some furnaces have changed their mode of running. Those were furnaces in which some chance gave rise to a tendency toward "external" running. Since, however, in practice the furnace working shows continual fluctuations, such furnaces work within limits defined by regular working on the one side and a sufficiently pronounced "external" mode of running on the other.

Coke Rate Under Control, But Not the Furnace Lining

Such a state of working requires constant, careful attention to the furnace, it being then possible to prevent an increase of coke consumption; the destruction of the furnace lining, however, cannot be prevented. Non-uniformity of the stock and other chance conditions continually and repeatedly cause some por-



Section of a new thin-walled blast furnace being built by the Prague Ironworks Co.

tions at the periphery of the furnace to run more "externally" than is necessary, the result being the destruction of the furnace lining, mainly at the belly and at the bottom of the shaft.

How the Qualities of a Thin Wall Were Discovered

Since these irregularities take place alternatingly at various places at the periphery, it is not long before the furnace lining in the lower portions of the shaft is irregularly melted off to a "skin" only a few centimeters thick, which then holds out relatively well.

Observations made at Kladno and at Kraluv Dvur, that a furnace lining only a few centimeters thick, which was the case at the places where it was melted off, would last well for a comparatively long time led to the consideration of means of utilizing this fact. Since the thick lining melted off at the inner surface because it was not sufficiently cooled, whereas the thin lining cooled by air proved to be successful, it was easy to conceive the idea of building thin-walled furnaces. The chief argument against this idea, which was supported by the literature on Burgers furnaces, was the fear of an increased fuel consumption.

Since, however, furnaces with melted-off linings and irregular deposits on the walls, being uncontrollable, worked on a higher coke consumption than sound furnaces maintaining their original lines, which could not last long, and since, besides, there were many failures in operation, it was expected that the introduction of thin-walled furnaces might lead even to some lowering of the coke consumption in comparison with that in furnaces of the old type, and certainly would result in a decrease of failures in operation.

And the not very satisfactory experiences of older days with cooling plates, which were then installed in the furnace bosh, led to the introduction of armored water-cooled thin-walled furnaces. The first was installed four years ago at Kladno, and now the Prague Ironworks Co. is already building its fifth furnace of this type. Experience gained during these four years has fully justified the expectations. The furnaces preserve practically constantly their original lines, the lining does not melt away for long periods of time, troubles in operation are decreased, and the consumption of coke is not increased, but is even lowered.

Saving in Coke in New Design

Consumption of coke during the last four years of operation at Kladno and at Kraluv Dvur was compared with that of former days on the basis of diagrams plotted from data obtained with charges of various richness, consisting of similar ores, and otherwise smelted under the same conditions. It was observed that the average coke consumption was lower in

thin-walled furnaces than in furnaces of the older type.

Due to the fact that the lines of the thin-walled furnaces remain practically unchanged for long periods, the furnaces are always under control, and therefore failures in their operation occur less frequently, and the operation itself is rendered less difficult. Of course, thin walls do not prevent the possibility of the building-up of deposits; these deposits, however, do not occur so readily and may be comparatively easily removed owing to the ease with which these furnaces can be controlled.

The only disadvantage of these water-cooled furnaces which may be mentioned is an increased consumption of cooling water. Their construction itself is not more expensive than that of the furnaces of the older type; the lining being only 150 to 250 mm. (6 to 10 in.) thick, the saving on the cost of the fireclay bricks is equal to the extra cost of armoring the furnace. Moreover, when it is appreciated that the erection of a heavy supporting structure is not required for new furnaces the great advantages which the company derives from these thin-walled furnaces become even more obvious.

Comparisons with Practice Elsewhere

Discussing the paper on thin-walled blast furnaces, A. Hutchinson, Saltburn-by-the-Sea, vice-president of the institute, said that the results outlined in this paper are of great importance and he hoped that more information along the same lines would be given by the author.

W. E. Simons, Cardiff, mentioned some of the difficulties encountered with blast furnace linings in England, especially the wearing away of the thick lining above the lintel, and the troubles in properly cooling a lining at this point with water. He agreed with the author that it is safer to use a thin lining, and said his company is now cooling the lining by an inner shell of steel. He asked what tonnages could be made on a thin lining.

David E. Roberts, Cardiff, reminded the audience that thin-walled blast furnaces were used in America 20 years ago, and said that, for his part, he was not convinced of the advantages of a thin lining below the lintel.

The author's representative, replying to Mr. Simons's question, said that a thin-walled furnace has been running for four years continuously, at a production of 2500 to 3000 tons a week, and is still in operation.

It may be added that the American attitude regarding thin linings is that the dimensions of the furnace cannot well be increased without material changes of the shell construction and yet both diameters may some day be further increased.

Crystal Forms of Galvanizer's Dross and Zinc-Iron Alloys

By WALLACE G. IMHOFF*

IMPORTANT practical facts can be obtained by closely examining the crystal forms of galvanizer's dross, and zinc-iron alloys, formed in the hot galvanizing process. Those constantly associated with the problems of this industry know that there is a wide variation in the character of galvanizing dross from plant to plant. Very few, however, are aware that there is any difference in the character of the dross crystals, or that any practical value can be attached to knowing anything about the crystal forms of dross, or of zinc-iron alloys in general.

Crystals are generally classified under six systems or groups. The metals iron and zinc are found in the following systems:

1.—*Isometric System or Cubic System.*—Three principal and six secondary planes of symmetry, with crystals referable to three equal rectangular planes of symmetry. Most metals belong to this system. Iron belongs in this system (Alpha, body-centered cubic; gamma, face-centered cubic.)

2.—*Hexagonal System.*—One principal and six secondary planes of symmetry, with crystals referable to four axes, three of which lie in the same plane intersecting at 120 deg., and are equal in length. The fourth axis is perpendicular to the plane of the three others at their intersection and may have either greater or less length. Magnesium, zinc and cadmium belong to this system.

Hexagonal System Fits the Case

To bring out clearly the crystal forms of dross and zinc-iron alloys which are illustrated it is neces-

sary to describe the hexagonal system or division in some detail. One of the crystals commonly seen is that of a rhombohedron, which belongs to the rhombohedral group of the hexagonal system.

This group is typified by the form of a rhombohedron—a solid bounded by six like faces, each a rhomb. It has six lateral edges forming a zigzag line about the crystal, and six like terminal edges, three above and three in alternate position below. The vertical axis joins the two trihedral solid angles, and the lateral axes join the middle points of the opposite sides.

The other form of the hexagonal group which will be discussed is the hexagonal double pyramid. There are six faces above and six faces below the hexagon forming the cross-section of this crystal.

In many cases it is hard to link up theory with practice, but in the case of dross crystals and zinc-iron alloys this is not so. Careful studies in laboratory and plant show that theory and practice agree in every respect. It is the purpose of this article to show this. A study, either in the laboratory or in the plant, must deal with a number of different components, such as the two metals—zinc and iron (the steel base)—and temperature.

Pure iron, which is seldom if ever found, crystallizes in the cubic or isometric system. Zinc, which also is seldom if ever found in the pure metallic state, crystallizes in the hexagonal system. Firebox steel, and the sheet steels galvanized, are fairly pure iron. Ordinary galvanizer's dross will average 96 per cent zinc. Therefore it is to be expected that the forces of crystallization would be strongest toward forming a zinc-iron alloy which would crystallize in



FIG. 1—Essentials of the crystal structure of zinc. At left is shown an elementary hexagonal close packed lattice. Next is a hexagonal lattice showing prism (1010) planes. At right is a hexagonal lattice showing basal (0001) planes and one of the pyramid (1012) planes.

*Consultant in zinc coating, or galvanizing; Vineland, N. J. This is the first of three articles dealing with the crystals found in dross and in zinc-iron alloys.

ROSS in galvanizing is such an important factor in the successful prosecution of the process that any light thrown on its condition of formation is a distinct aid to the profitable carrying on of galvanizing plants. This article goes into the crystal forms in which dross and other zinc-iron alloys are found, and explains how the temperature of operation affects both quantity and quality of these deleterious formations.

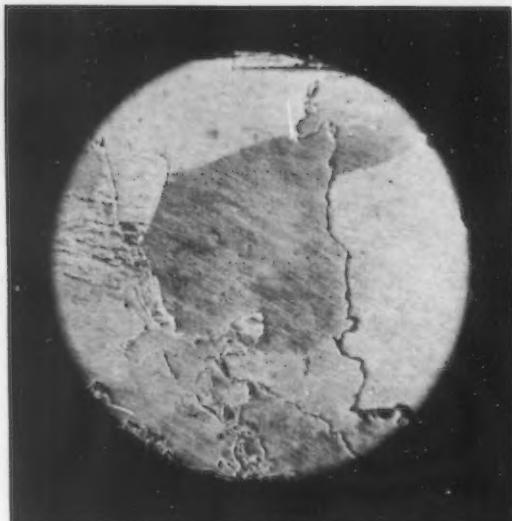


FIG. 2—Very pure zinc heated to 900 deg. F. for 6 hr. and slowly cooled in the furnace over night. No zinc-iron alloy could be detected. Magnified 18 diameters.

the hexagonal system. And that is exactly what happens.

A study of the galvanizer's dross and the zinc-iron alloy system is extremely interesting. The practical field of application of the knowledge is in increasing the pot life, in the formation of the by-product dross, and in improving the qualities of the various zinc coatings on all classes of iron and steel articles for various commercial purposes.

The best method of studying the crystal forms of the zinc-iron alloys is by studying first the galvanizing bath itself, then galvanizer's dross, and finally the zinc-iron alloy crystals themselves. Many experiments seem to indicate that the zinc-iron alloy system is an ever-changing series of zinc-iron alloys, beginning on the one end at a low temperature with alloys high in zinc and low in iron, and finishing on the other end at a high temperature with alloys low in zinc and high in iron. The entire series covers the field from low-temperature, high-zinc, low-iron combinations to high-temperature, low-zinc, high-iron content alloys. The temperature and the amount of the components present affect the crystal form of the alloy and its chemical composition. A distinction also should be made between the zinc-iron alloy in crystal form and that not crystallized.

Heating to 900 Deg. Fahr. Brought No Crystals

When very pure zinc was heated to 900 deg. Fahr. for 6 hr. and slowly cooled in the furnace over night, it did not show any dross or zinc-iron alloy. Fig. 2 illustrates what this zinc looked like at a magnification of 18 diameters. Even higher power lenses did not bring out any crystal forms at this temperature.

Pure zinc crystals can be readily recognized by their boundary lines between the dark and light areas. The cracks are due to the fact that the pure zinc used was in the form of sheet zinc, and the metal at 900 deg. Fahr. has not all completely run together. The small specks of black at the left are thought to be the beginning of the formation of the zinc-iron alloy crystals. No indications, however, point to the exist-

ence of any zinc-iron alloy, or dross crystals, in considerable amounts. Zinc oxide in the crevices or cracks is the only other material besides the pure metallic zinc that amounts to anything, and it is exceedingly small.

Crystal Found at Higher Temperatures

Another piece of this pure zinc was heated to 950 deg. Fahr. under the same conditions. Fig. 3 illustrates the melt from this test. The striking fact from this test is that the higher temperature has brought out the crystal form of the zinc-iron alloy so that it can be detected. Traces of both zinc-iron alloy and dross can be found. Note the black material at the left.

One small, distinct crystal of dross was found. The zinc-iron alloy, also, can be seen at this temperature. The same black foreign material noted in the last sample is apparent here. It is present in

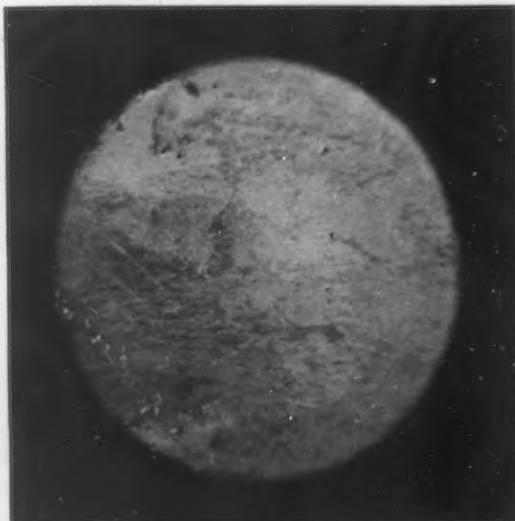


FIG. 3—Pure zinc heated to 950 deg. F. for 6 hr. and slowly cooled in the furnace over night. Traces of zinc-iron alloy crystals can be seen by the diamond-shaped figures at the left of the plate. Magnified 18 diameters.

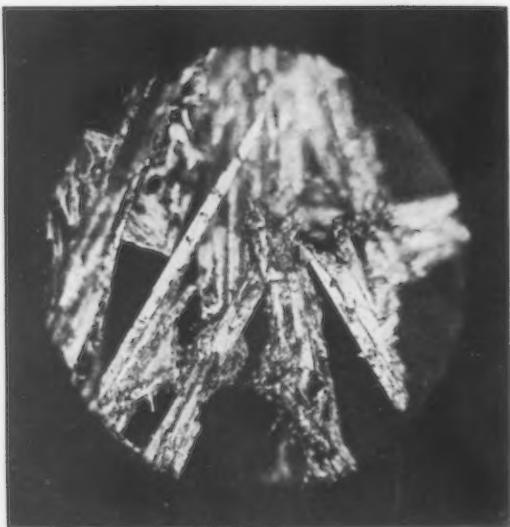


FIG. 4—Dross crystals; a bath temperature, 880 deg. F. These crystals are rhombohedrons. Magnified 18 diameters

larger amounts and seems to be specks of dross forming into larger crystals. It might be mentioned here, and will be clearly shown later, that the cross-section of dross crystals (zinc-iron alloy crystals) are rectangles, parallelograms, rhombs, squares and hexagons.

These two tests show that very small amounts of iron in zinc can be detected with the microscope, and that the crystal forms are brought out so that they can be seen at high temperatures.

According to Peirce, "Microscopically, iron is easily identified in zinc as the compound $Fe Zn_6$. It is a hard, white crystalline constituent left in high relief by polishing and less rapidly attacked than the zinc matrix in etching. In the laboratory of the New Jersey Zinc Co. small, widely scattered crystals of this compound have frequently been observed in specimens containing as low as 0.025 per cent iron, and these remain unabsorbed after 110 hr. annealing at 400 deg. C."

My own investigations agree closely with those of Peirce. One point which possibly should be discussed further is that I have found that the lower the temperature, the more readily the iron seems to be taken up into solid solution; and the higher the temperature the more readily the iron separates out as zinc-iron alloy crystals. With such a very small amount of iron present, it could not readily be seen, or be detected under 900 deg. F. Above this temperature, however, the forces of crystallization become stronger, and the crystal outlines could be readily identified.

This discussion perhaps can be made clearer by simply stating that the higher heat intensifies and develops the crystal form of the zinc-iron alloy into a shape which can be more readily seen and recognized. This is due to the fact that the crystals form from the outside in, and cases have been found where there was only enough iron present to form the outline of the crystal.

Turning attention for a moment to commercial slab zinc and the galvanizer's bath, it can be stated the better grades of prime Western slab zinc for galvanizing carry only 0.04 to 0.06 iron content, which

is very low. There are, however, many brands of slab zinc sold which have an iron content much higher, and some are considerably above the allowable limit of 0.08 per cent. This is particularly true with brands of remelt zinc, which are sometimes used for galvanizing purposes, although even some brands of remelt zinc have an enviable reputation for their purity, in so far as iron is concerned.

Dross Crystals Characteristically Long and Slender

Ordinary galvanizer's dross separates out of the bath in long, slender, needle-like crystals. Fig. 4 shows some of these crystals at a magnification of 18 diameters. Careful study of these crystals shows they are in the form of rhombohedrons. Attention is also called to the fact that almost all ordinary plant dross, under 900 deg. F. bath temperature, is of this type of crystal. Those in the illustration are from a pot showing a bath temperature of about 880 deg. F. The temperature of the bath is one of the determining factors of the chemical composition of the zinc-iron alloy formed.

This crystal form of plant dross is illustrated also by a photomicrograph of some actual plant dross made under practical conditions, at an average bath temperature of 840 to 850 deg. Fig. 5 shows the saturated metal in the bath and the zinc-iron alloy crystals which have separated out. This particular plant dross showed an average iron content of 2.61 per cent for the dross. In considering this alloy, however, from the standpoint of zinc-iron alloys, it consists of about 20 per cent zinc-iron alloy crystals of an unknown chemical content, and 80 per cent of known metallic zinc saturated with about 0.1 per cent of iron.

I have not found any way of getting these crystals out separately from the bath to permit analyzing them for iron content. Rawdon says, "The method described by Storey for the preparation of this compound ($Fe Zn_{10}$) (i. e., separating the crystals in zinc "dross" from the zinc-rich matrix in which they are embedded by dissolving the matrix in dilute acid, collecting the undissolved crystals and remelting them) has not proved successful in experiments by the author."

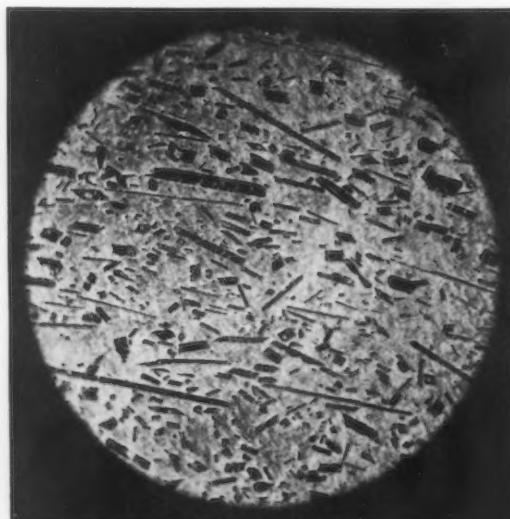


FIG. 5—Ordinary commercial plant galvanizer's dross, as seen under the microscope, magnified 36 diameters. These crystals are rhombohedrons

For the moment it is interesting to consider these crystals a zinc-iron alloy of the chemical composition $Fe Zn_{10}$. Also assuming 30 per cent of the field to be crystals, this would leave 70 per cent as the saturated melt. The zinc-iron alloy $Fe Zn_{10}$ contains about 8 per cent iron; the saturated bath about 0.1 per cent iron. The dross showed an iron content of 2.61 per cent. This may be roughly checked, therefore, by taking 30 per cent of 8 per cent iron and 70 per cent of 0.1 per cent iron, which give an average value for the whole at 2.47 per cent iron.

Why "Dross Makes Dross"

Theory is all very fine, but the practical galvanizer will come right back and ask for an explanation of "sweating" of the dross, and why it is that "dross makes dross." This question is extremely hard to answer, in the light of known theory on this subject. I am therefore going to attempt an explanation which, in the light of theory, may be wrong, due to absence of definite facts and data to support it. But it does seem to explain things in the light of what appears to be happening under practical conditions.

This explanation involves two constantly changing variables as affected by temperature. The first variable is the iron content of the bath as affected by the temperature; the second is the chemical composition of the zinc-iron alloy crystals as affected by the bath temperature. Readjustment between these two variables is going on all the time under practical conditions. Men who have "sweated" dross to obtain the metal from it, and who have felt the "pulse" of galvanizing operations, know only too well that, as the dross is heated, it becomes dryer and dryer, and the zinc-iron alloy crystals pack tighter and tighter.

For the time an attempt will be made to explain the practical features encountered, neglecting the purely theoretical viewpoint. The first question to be answered is, "How many zinc-iron alloys are there?" There really is an indefinite number, beginning on the low-temperature end with zinc-iron alloys very high in zinc, and passing progressively through a long range, or series of combinations, to the high-temperature zinc-iron alloys, which contain more iron and less zinc.

(To be continued)

Average Life of Electric Furnace Roofs

SOME informative data have lately been published on the influence of the age of an electric furnace on the length of the heat and the energy consumption. This is discussed in an article in *Stahl und Eisen* by S. Kriz and H. Kral. The authors were inspired by the work of Herberholz who, not long ago, made a study of the influence of the age of a furnace on the fuel consumption in an open-hearth furnace and they have made investigations along similar lines on a 5½-ton Natusius basic-lined electric furnace, making principally alloy steels of high quality. Some of their results are reported as follows:

The average life of the furnace crown was 29 heats, and the trials extended over 2000 heats. The average time of one heat, taken over the whole period, was:

Melting down period.....	3 hr. 29 min.
Refining period.....	2 hr. 36 min.
Total time.....	6 hr. 5 min.

The energy consumption averaged:

In the melting down period.....	620 kwhr. per ton
In the refining period.....	323 kwhr. per ton
Total	943 kwhr. per ton

The time of the first heat after renewing the crown was 35 per cent longer, and the current consumption was 25 per cent higher than the average in both cases. The minimum time and lowest current consumption were reached at the fifth heat, after which the curves gradually rose.

The current consumption curve for the refining period rose more steeply than that for the melting down period. At the 29th heat, the current consumption was about 12 per cent above the average during refining, while it was only 5 per cent above during melting down.

The So-Called Heterogeneity of Martensite

THE cause of the irregular distribution of precipitated cementite in steels tempered at 1100 to 1200 deg. Fahr. has recently received the attention of E. Maurer and G. Riedrich (*Stahl und Eisen*, Oct. 9, 1930). Samples of hardened hypoeutectoid and hypereutectoid steels were examined microscopically at the same areas after each of a series of temperings at increasing temperatures to ascertain whether the carbon in the martensite is unequally distributed or whether migration of carbon occurs during tempering.

Steels containing 0.58 and 1.7 per cent carbon, after heating at low temperatures, showed uniform distribution of precipitated cementite, but irregularities in the distribution developed and became more pronounced as the temperature was raised. There is evidently a tendency of the precipitated cementite to migrate to the boundaries of original martensite needles because, with increasing differences in carbon distribution, fringes of cementite appear at these boundaries and the effect increases with the temperature.

The same process occurs when quenched troostite is tempered. The observed migration of the cementite is said to prove that martensitic carbon is uniformly distributed both in hypereutectoid and hypoeutectoid steels in agreement with Maurer's theory of hardness.

A number of etch tests with alcoholic nitric acid and alkaline sodium picrate were made to determine the structure of hardened hypoeutectoid steel. Steels containing between 0.86 and 0.45 per cent carbon showed the presence of some untempered martensite, but the likeness to tempered martensite increased with decreasing carbon content. At carbon contents less than 0.20 per cent, increasing quantities of ferrite were visible with no unaltered martensite, which is in accord with the fact that steels containing less than 0.3 per cent carbon exhibit no diminution of volume on tempering at 212 deg.



PROGRESS BEING MADE IN "FORD CITY" OF RUSSIA

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ONE of the new industrial cities of Russia is being built by the Austin Co. of Cleveland, which has received photographs showing the progress of the work. This city, when completed, will be the "Ford City" of Russia. It is 270 miles east of Moscow. In its plants 150,000 Ford automobiles will be manufactured annually. The cost will be about \$60,000,000.

Residents of the automobile city will have all of the comforts of American apartment dwellers. The

upper illustration shows the four-story apartment houses being built for workers in the automobile plant.

The center photograph shows work on the manufacturing buildings, which are of reinforced concrete with brick curtain walls. Horse-drawn carts are used for hauling materials. The lower picture shows the building of the first concrete highway in Soviet Russia. This road will be one of the principal thoroughfares of the Ford city.

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Open-Hearth Men Consider Furnaces, Fuels and Mold Washes

IN the two immediately preceding issues of *THE IRON AGE* will be found a great portion of the discussion of open-hearth problems participated in by the open-hearth operators at Cleveland on Nov. 20 and 21. This committee, organized under the American Institute of Mining and Metallurgical Engineers, has been taking up semi-annually specific work-a-day problems. The discussion is practically all extemporaneous, and is intended for the purpose of assisting the men to make better steel and at a lower cost. In the following paragraphs will be found the remainder of the discussion not covered in the two sections already published.

Cost of Open-Hearth Roofs

ONE operator, running a furnace with a roof 38 ft. long and 19 ft. wide, including a sloping backwall, reported a cost of \$900 for a 12-in. wall with 18-in. ribs, and with 15-in. thickness at front and back. With all of these dimensions increased by 3 in., the cost worked out at \$1,050. The first roof gave about 180 heats, while the second ran 235 heats with producer gas and 327 heats when oil was used as a fuel.

A suspended roof cost \$2,470, of which \$1,182 was for brick and \$1,288 for the supporting framework. This life was not up to that of the 15-in. roof previously reported upon, because the alternate expansion and contraction of the brick against the supporting members, when the furnace was shut down over a weekend or otherwise, caused many of the brick to break and fall out.

Another operator having about the same size roof reported a cost of \$1,050 for a thickness of 12 in. in the valleys and 9 in. in the center; \$1,122 for a 12-in. thickness throughout; \$1,455 for 15-in. valleys and 12-in. center; \$1,525 for 15-in. thickness throughout; \$1,984 for 18-in. valleys and 15-in. centers. When building a roof with ribs on 22½-in. centers, he reported \$1,263 for a 12-in. roof with 15-in. ribs; \$1,700 when both these thicknesses were increased 3 in.; \$2,250 when he went up to 18-in. roof with 21-in. ribs.

A refractory man told of a new roof of the suspended type in which brick are used which are dovetailed into each other. These brick, he said, will not fall out under the conditions reported above.

Several men reported upon making repairs along the skewback by means

of special supporting devices to take the brick as they are put in place. These took the form in most cases of centerwork, supported by steel pipe or angles or other framework built to the radius of the roof. A section at a time is put in and then the framework moved to the next section or ring. Some of these supports are suspended from the crane, in which case two sections have to be taken out; then one is built and the support moved along one section to permit building the next. As much as 75 additional heats have been added to the life of some furnaces by this means.

Making Repairs Without Shutting Down

At this point the chairman remarked that, while the sloping backwall has worked out very well in maintaining the life of the backwall, its advantages have not been extended to the roof in the measure which was originally expected. There is a cutting out of the roof along the skewback about the same as with the

straight backwalls of earlier practice. The gas seems to hug that corner just as before.

One man reported that, in his opinion, the cutting out of the roof over the tap-hole is due more to inefficient combustion than to any other cause. He thinks that unburned fuel is responsible for much of this trouble.

How a Roof Was Insulated

An operator in the Chicago district has insulated the roof of one of his furnaces, in keeping with the fact that the rest of the furnace is insulated. He put on 2½ in. of insulation after the furnace had made less than 100 heats on its run. It has now made about 350 heats and the main part of the roof is standing up just as well as the uninsulated roofs. The furnace was down for one month during this period, which resulted in trouble because of dropping bricks, but it does not appear to have affected the life of the roof very much.

When this furnace was first started up after insulation, the roof became much hotter than the hearth, because of the fact that the radiation loss from the roof was not what had formerly been experienced. This trouble, of course, has been corrected, now that the reason for it is known, and the roof looks pretty good. There has been no measure of the fuel saving but, as the radiation losses are less and the stack temperature has not been increased, there must be some saving.

Need for Close Flame Control

Radiation was formerly thought necessary, one man said, to give the roof its natural life. It was found possible, however, to put insulation on in this case because of the absolute control which the operator has of his flame at the entering port. When heating up the furnace, more care necessarily will have to be exercised if the roof is to be saved.

Another man insulated an area about 10 ft. square near the end of the bath over one of his furnaces, by putting a layer of 3 in. of rock wool on that spot. He found no difference in the working of the furnace, but the brick under the rock wool were red hot all over. He is going to make the experiment of taking slabs of insulation and laying them across the ribs of a furnace roof, thus giving an air cushion between ribs about 4 in. thick.

A refractories man said that, if the

HOW to lay an open-hearth furnace roof without spending too much money on it, how to use a port which can be withdrawn to leave a large opening for outgoing gases and then shoved in place so that the ingoing fuel may be properly controlled, how to get best results from the surfaces of ingot molds and stools—these are some of the problems discussed in Cleveland last month by the Open-Hearth Superintendents' Conference. The cross-section of opinion from different plants in all sections of the country was found most illuminating, and those present expressed themselves as having been able to get a great deal of practical assistance, helping them in the prosecution of their work, through this free interchange of ideas, which has now been going on for more than six years.



silica brick in a roof are heated up uniformly all the way through, as they are when insulated, they ought to give a longer life than when there is the gradation of heating from inside to outside of furnace. The secret in this case lies in keeping the flame under absolute control, so that it may be kept away from the roof and thus avoid burning.

Combustion Control for Gases

A GENERAL report upon the progress of arrangements for control of combustion in open-hearth furnaces showed that nearly 50 furnaces are now operating under some form of control. These are scattered over 10 or 12 steel plants and, in some cases, have made as many as 2500 heats. Enough experience with them has been obtained so that most encouraging results are reported. In addition to a direct saving of from 10 to 25c. in fuel on each ton of ingots, there are many intangible results reported, all of which show betterment over preceding practice.

Present trends are leading toward the use of complete automatic control. Much, however, can be done in the way of partial control, with correspondingly smaller benefits. A good fuel engineer can make the use of such control particularly valuable to his company, even where the furnaces are not provided with complete equipment. His activity can go a long way toward getting the desired results.

Two methods of control were described by representatives of the companies pushing them, one being the Askania pressure control of H. A. Brassert & Co., Chicago, and the other the Hagen draft control of the American Heat Economy Bureau, Pittsburgh. Economies reported from these systems include less fuel to the ton of steel, faster heats, and a longer life for the furnace. The Askania type depends upon keeping a constant pressure in the gas main. It is employed with producer gas or with mixed gas in conjunction with a mixer control.

In the case of the Hagen draft control, it was pointed out that the logical point for regulation of draft lies at the frontwall of the furnace. Fully half of the success of a system of combustion control was said to lie in the draft control itself.

Luminosity of Flames

CONSIDERABLE difference of opinion developed between some of the operating men in connection with the value or otherwise of luminosity in the incoming gases in an open-hearth furnace. One man using natural gas reported that he is burning a small amount of oil with it for the express purpose of producing luminosity. Against this a Canadian operator stated that a non-luminous flame is much to be preferred, and reported that his furnaces were giving excellent results under those conditions. The flame in the furnace is

practically invisible, but he is getting fast heats and on a low fuel consumption.

Natural gas was stated by one operating man as giving the closest approximation to the long, luminous flame produced by oil. It can be controlled in every way, as to length, temperature, etc. Even though the bath may be kept white hot, the arch wall may be almost black, with such a flame.

A fuel engineer stated that the longer the flame the better will be the furnace economy, provided combustion is complete before the outgoing gases leave the furnace. Perfect diffusion of the gases requires the absence of turbulence.

Results from Use of Flame Without Luminosity

In the plant using a non-luminous flame, the brick consumption for a whole year was reported at about 7 lb. to the ton, which amount would be increased to perhaps 10 lb. if the checkers be included. These figures may be compared with 33 lb. stated as the result with a Terni furnace with no water cooling. The checkers in the Canadian furnace have not been taken out for about 17 months.

One furnace on which this report was made turned out 93,787 gross tons of ingots in 704 heats in one year. The average heat was 132.2 tons and the yield about 92.8 per cent. Fuel consumption averaged 4,500,000 B.t.u. or the equivalent of 370 lb. of coal. The average heat took 11 hr. 25 min. from tap to tap, and produced 12 gross tons an hour.

This furnace was actually operating more than 88 per cent of the number of hours in the year. About 6 per cent was spent making bottom, 3½ per cent on repairs, 1½ per cent was absorbed in holidays, and less than 1 per cent in other miscellaneous delays. This operator expressed the opinion that the luminous flame is much hotter (and harder) on the brickwork than the flame he is using. Another man described the modern trend on producer gas as being toward a higher velocity of flame propagation.

Rose Open-Hearth Port

A MOVABLE port was described by one of the operating men, which consists of the port proper, a seat and a water-cooled frame. There is also a water-cooled frame on the end wall to maintain a definite size in the opening for the port to travel through when being withdrawn. Allowance has been made for expansion, a packing ring being used to close the opening and make a seal.

It was reported that the port outlines are well maintained, with this port. More than 200 heats on the front wall are made, compared with 40 to 70 heats on the same furnace before this port was installed. Owing to business conditions the furnace was taken off after the roof had made 354 heats. It was still in good condition and was said to appear capable of

withstanding another 200 heats. This compares with a maximum of 380 heats on the furnace before the new construction was undertaken.

What the Rose Port Does

Advantages achieved by the use of this new port include increased area available for passage of the waste gases, with corresponding reduction of velocity of the outgoing gases, resulting in reduced erosion and repair cost and also fewer shut-downs for purposes of repair. There has been a material decrease in the erosion of the front wall, the back wall and the roof. The port gives virtually an open-end furnace to the outgoing gases. These waste gases can be divided as desired for passage through the gas and air regenerators.

This port is operated in conjunction with a producer gas furnace and has been run on a variety of mixes of charge, with as low as 33 per cent pig iron against 67 per cent scrap and as high as 69 per cent pig iron and 31 per cent scrap. In working the latter heat 8 per cent of ore was needed.

One speaker referred to the use of this port as giving a high-velocity incoming gas and a low-velocity outgoing gas. This results in a good heat transfer from the high-temperature flame through the slag to the metal.

Continuous Gas Analysis

Little use was reported of continuous analysis of gases. In one or two instances continuous CO₂ analyses are made, but this is not general and appears to be the only continuous analysis of any kind of gas in the industry.

Progress in Refractories

EXPERIMENTS in connection with synthetic refractories were described at some length by Prof. William E. McCaughey of Ohio State University, Columbus. He has made use of synthetic di-calcium silicate compounds and tri-calcium phosphate compounds in efforts to obtain a more complete knowledge of the characteristics and action of slags. The silicates were found to carry the phosphates in solid solution. Magnesium oxide in the free state was found to be associated with these other elements.

Presence of enough lime in the slag will separate out from it the magnesium oxide and manganese oxide. Magnesium oxide was found to have low solubility. As evidence of this a slag which has been for 10 or 12 hr. in contact with the bottom materials high in magnesium oxide takes up only about 5 per cent of it. It has been found also that an excess of lime has thrown out some of the magnesium oxide.

Use of Henning Purifier

Magnesium oxide can take up twice its own weight of iron oxide without itself going through the stage of melting. The opinion was expressed that corrosion of the bank of a furnace is not so much chemical as it is mechanical, the latter being due to the

turbulence of the metal while the slag is working.

One operator reported a reduction in the sulphur in the metal obtained by pouring Henning purifier through the cupola metal in the synthetic method of producing wrought iron, prior to adding the slag to the mass. This metal can be held only a short time with safety, however, after being treated with the purifier, inasmuch as the latter attacks the brick and eventually, it was said, throws the sulphur back into the metal.

Mold and Stool Coatings

A SHARP difference of opinion was registered as to the beneficial effects or otherwise of coating ingot molds and stools with tar and other washes. One man reported considerable trouble from cracked corners of ingots whenever he sprayed molds with tar. Another man who had had similar trouble said that he probably would never again use tar for this purpose. The excess tar over that which adheres to the surface of the mold settles to the bottom and causes terrific splashing when the stopper is first opened, through contact of the hot metal with the wet tar. This operator says that he has

adopted the use of aluminum paint as a mold wash for all molds of special steels, both of the rimming and the killed variety.

Another operator stated that it is necessary to dip the molds into tar at about 500 deg. F. for satisfactory results. This is in contrast with spraying it on when the mold has a temperature of about what the hand can stand, as reported by a previous speaker. If the temperature is much above 400 deg. coke deposit results. If it is lower, the coating is too thick. This point of view was that also of another man, who expressed the opinion that dipping must be used for uniform coating, as the use of a spray gives an uneven coat.

Advantages Derived from Meetings

AT the close of the last technical session the chairman asked for an expression of opinion regarding the advantages which the men have derived from these conferences. Several operating men spoke regarding the benefits which they have been receiving from these semi-annual meetings, and expressed the opinion that they had been thoroughly worth while.

It was said to be difficult to put one's finger on any quantitative or direct measure of what had been accomplished in the different plants through the frank interchange of ideas which has been had. Each man said, however, that he had been using information thus gained, and that his contacts both at the meetings and between meetings have been productive of much good in his practice.

It was suggested by one man that occasionally the meetings should have the benefit of opinions from men on both sides of the open-hearth furnace—the blast furnace man on one side and the rolling mill man on the other.

This proposition did not meet much favor, however, because it was felt, in the opinion of several speakers, that any such dilution of the meetings would result in getting less direct open-hearth benefit and that, inasmuch as this is distinctly a series of meetings devoted to the one topic, it should be the object to concentrate on that topic, with such occasional reference to the other and abutting requirements as might be had by the experience of some of those present who are responsible for a wider range of operation than merely the open-hearth department.

New Roll Grinder Has Flexible Cambering Mechanism

DESIGNED for grinding barrels and journals of both parallel and cambered rolls, the new roll grinders built by Cincinnati Grinders, Incorporated, Cincinnati, embody a number of unique and interesting distinctive features. One of these machines, a 34 x 192-in. grinder, has recently been installed for grinding both parallel and cambered rolls, these rolls having journals arranged for both plain and anti-friction bearings.

The general arrangement of this grinder, which is of traversing table type, is shown in Figs. 1 and 2. All motions are motor driven, five motors

being employed as follows: One 10-hp. variable speed motor for work rotation; one 30-hp. constant-speed motor for driving the grinding wheel spindle; a 5-hp. constant-speed motor for driving the feed box operating the table traversing mechanism; a 1-hp. constant-speed motor to operate the wheelhead rapid-traverse mechanism; and a 1/2-hp. vertically-mounted constant-speed motor for the vertical centrifugal pump used to circulate the coolant supply.

Outstanding features of this machine are the centralized control, the operator controlling all functions from

one small platform, and the simple and flexible cambering mechanism which enables rolls to be contoured to suit requirements. In view of the fact that the rolls mounted on anti-friction bearings have tapered roll necks, it was necessary to equip the machine with a swiveling top table that could be rapidly set over for grinding this taper.

Special mounting blocks fitted to the table enable rolls once fitted up with anti-friction bearings to be ground on the roll barrel without removing the anti-friction bearings from the end of the roll. The axis of ro-

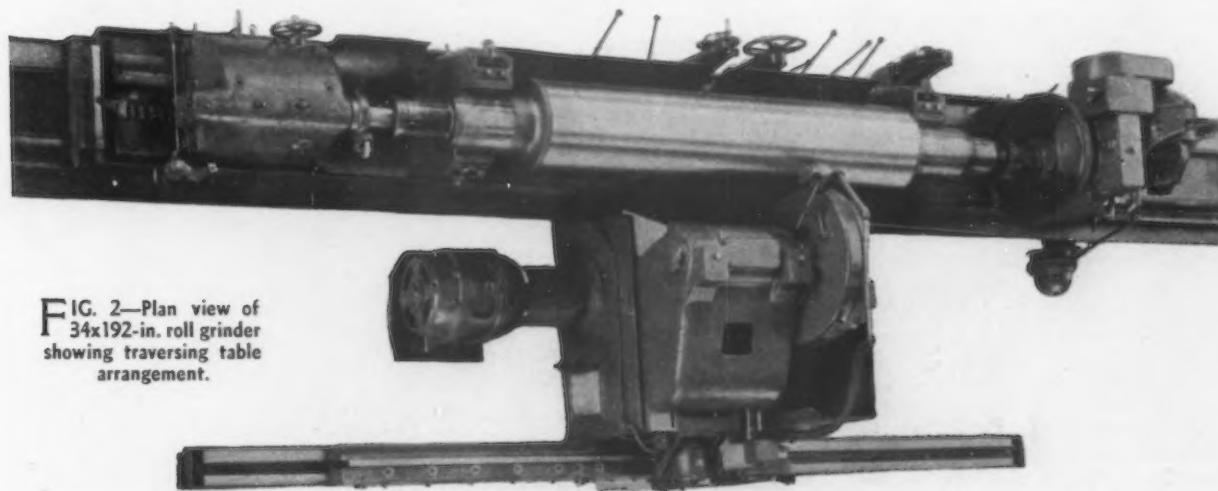


FIG. 2—Plan view of 34x192-in. roll grinder showing traversing table arrangement.

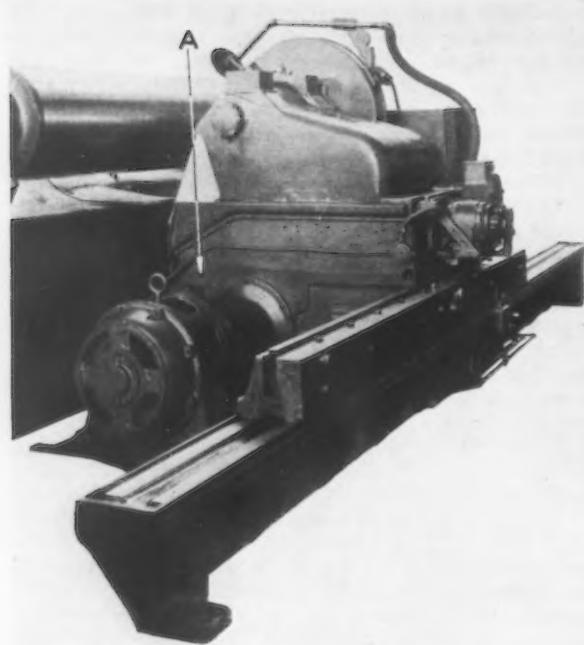


Fig. 1—(at center of page) is a front elevation of the new roll grinder. Fig. 3—(at bottom of page) shows how the footstock carries the radius truing device for rounding the corners of the grinding wheel when grinding fillets in the roll ends. Fig. 4—(at left) shows general arrangement of wheelhead drive and cambering mechanism.

tation, therefore, is maintained during the grinding operation in a way which is a duplicate of the actual operating condition of the roll in the mill.

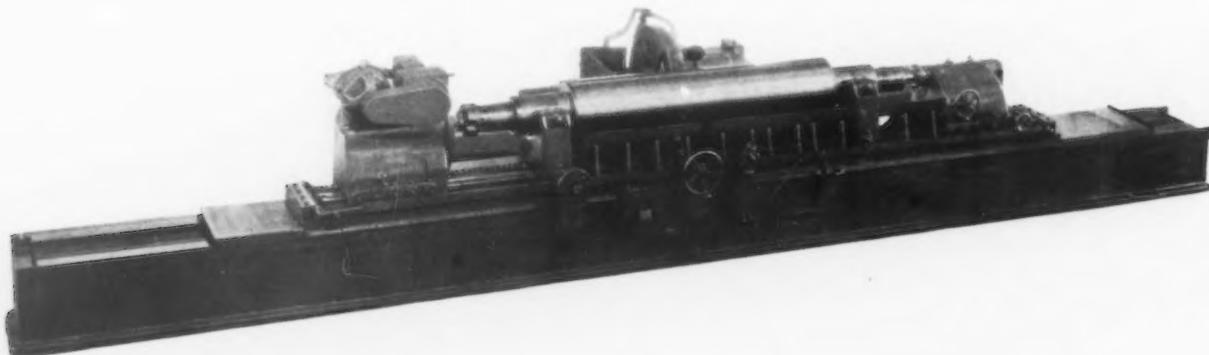
Operating conveniences provided on

wheel-face crowning equipment for use when grinding rolls of concave contour. An anti-friction type stop mounted in the center hole is used when rolls are being ground on journals. The footstock, as well as the

clamps hold these units rigidly in position on the table. The table traversing mechanism is of the regular Cincinnati design, with oil circulated under pressure to the table ways.

General arrangement of the main drive for the grinding wheelhead is shown in Fig. 4. The wheelhead spindle is mounted on preloaded S.K.F. bearings. The drive from the jack-shaft to the grinding wheel spindle is obtained through Morse silent chain of special design. The slack side of the chain is steadied by means of a large cast-iron shoe with a curved contact surface.

Fig. 4 also shows the general arrangement of the cambering mechanism. In commenting upon the thought underlying this design, R. E. W. Harrison, chief engineer, Cincinnati Grinders, Inc., states that the practice of cambering rolls has for many years been based largely upon empirical data. Much assistance has been forthcoming from designing engineers and mathematicians, but the fact remains that the camber requirements of most rolls are determined by a number of variables which make each installation the necessary subject of special study. It has, for instance, been realized, Mr. Harrison says, that roll cambers are influenced by roll diameter, roll material, and the hardness of this material and its



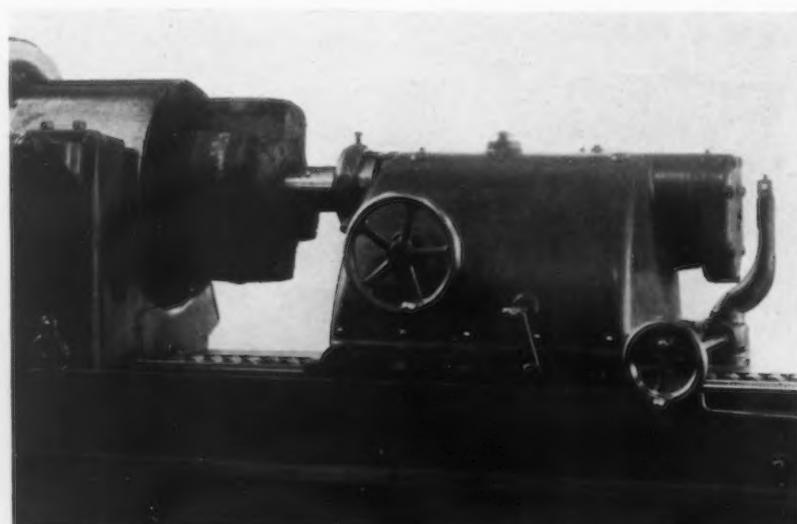
this tool include hand-operated rheostat control of work rotation speed, push-button start and stop switches for all motors, selective speed changing with one lever for all table traverse speeds, and micrometer infeed control to the grinding wheel, with an auxiliary rapid traverse mechanism for rapidly positioning the grinding wheel when changing from one major diameter to another. The hand wheel controlling the motion of the footstock barrel is placed so that the operator can stand close to the work and guide it on to the center.

The larger sizes of rolls are ground, of course, with the roll resting upon its journals. But the machine is arranged so that it will efficiently handle small diameter rolls, and it is in conjunction with such work that the small items of operating convenience are most appreciated.

It will be seen from Fig. 3 that the footstock carries the radius truing device for rounding the corners of the grinding wheel when grinding the fillets in the roll ends; although not visible, the footstock also carries the

headstock, is equipped with a lever and pawl arrangement, the latter engaging on the top of the table to eliminate creepage of either the headstock or footstock, and triple-acting

modulus of elasticity. While these factors can be dealt with and are fairly reliable subjects for calculation, it has been found impossible to estimate accurately the amount of compensa-



tion to allow in roll contours for such variables as change in temperature of the material being rolled, viscosity of the oil used to lubricate the rolling mill, the spring of the mill under varying loads and the amount of reduction on the material passed through the rolls.

Rolling mill engineers have been successful, of course, in establishing roll cambers or curvatures capable of giving commercially satisfactory results, but there has been a growing demand for a camber mechanism that will enable contours to be produced on the roll surface where the variables mentioned above are such that they interfere with the production of accurately thicknessed sheets, states Mr. Harrison.

It was to meet these exacting requirements that the camber mechanism shown in Fig. 4 was produced. This mechanism consists essentially of an auxiliary bracket carried on a three-point support, the center support being bolted securely to the rear base of grinder and the two outer feet resting on wedge blocks on the shop floor. A carriage is mounted on this accurately machined base, and this carriage is somewhat longer than the maximum length of roll surface to be ground.

By means of a large diameter shaft a synchronized movement is obtained between the carriage and the roll-grinder table. Cambering of the roll surface is obtained by tilting the grinding wheelhead at the pivotal point *A*, Fig. 4, the swing of the grinding wheelhead and its supporting base being controlled accurately by means of the camber bar carried in the sliding carriage. Contact between the camber bar and sub-base of the grinding wheelhead is obtained by means of a bronze faced shoe bolted to the rear of the wheelhead sub-base.

The camber bar itself, from which the contour is obtained, can be of permanent form, or, as shown in the illustration, it can be made from a parallel deep-section hardened and ground steel bar which is sprung and clamped in the sprung position to meet the requirements of the particular roll being ground. An indicator device reading in 0.0001-in. permits checking the amount of curvature put into the camber bar.

The drive from the grinding machine table traversing mechanism to the carriage of the camber mechanism is powerful and accurate, and smoothness of motion is obtained by the force feeding lubricating system used on the cambering mechanism, which is a duplicate of that which is used on the main table of the machine.

Builders of small wooden boats have been experimenting with the use of Monel metal nails for boat fastenings. They are said to be rigid, rust proof in salt and fresh water, highly resistant to corrosion and have good holding power in wood.

Universal Gear Testing Machine

STRAIGHT and spiral bevels with any shaft angle, hypoids, helical, angular helical, internal, herringbone and spur gears can be tested on the universal machine recently introduced by the Gleason Works, Rochester, N. Y. The capacity is for gears up to 13 in. outside diameter. The gears are tested by running them together, either with or without load. The load is applied manually by a brake operating on the driven spindle.

Sturdy construction to assure maintaining the extreme accuracy necessary for testing gears is a feature, and with the adjustments provided the machine can be set up for any type of gear within its capacity. The adjustments can also be used to estimate the amount of change required in the settings of the cutting machine to provide the desired tooth bearing in the correct mounting of the gears.

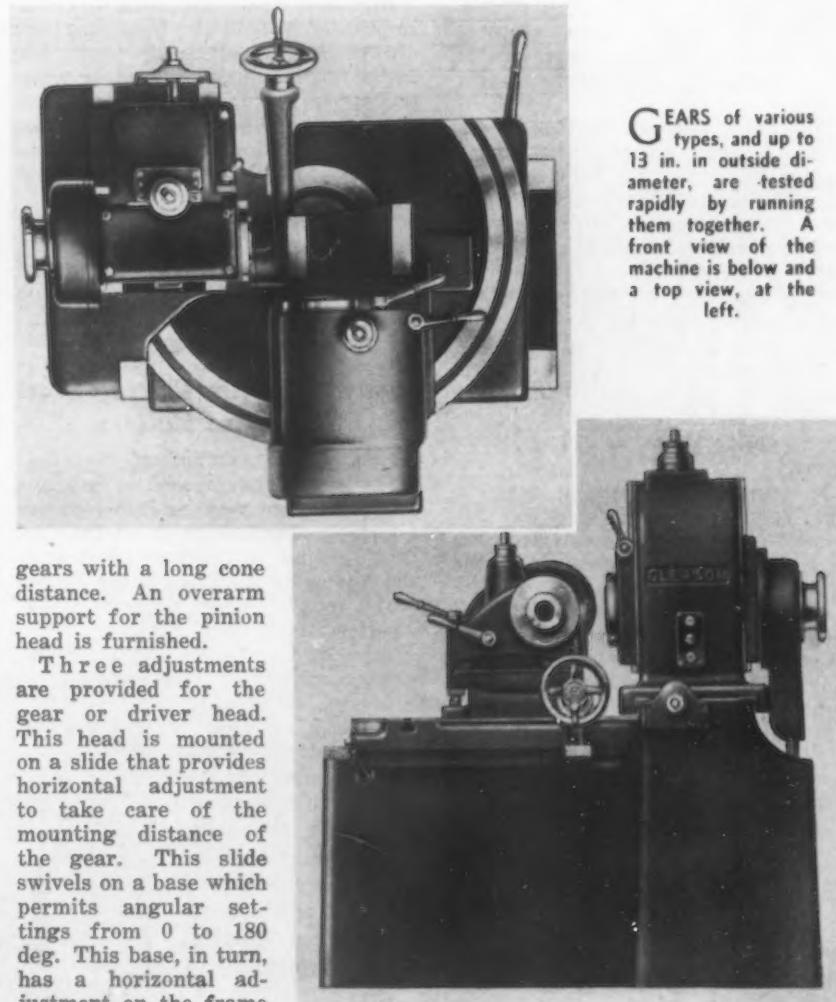
The driver or pinion spindle can be operated in either direction. It is mounted in a head which can be adjusted vertically on the column to obtain the necessary offset of the pinion from the center of the gear. This adjustment is made with a lead-screw, while a dial graduated to show 0.001 in. indicates the setting. The column has a horizontal adjustment on the frame for testing angular

to provide for a change in the mounting distance of the pinion. The angular setting can be made to an accuracy of 20 sec., while the two horizontal adjustments are made by means of lead-screws with dials graduated to 0.001 in.

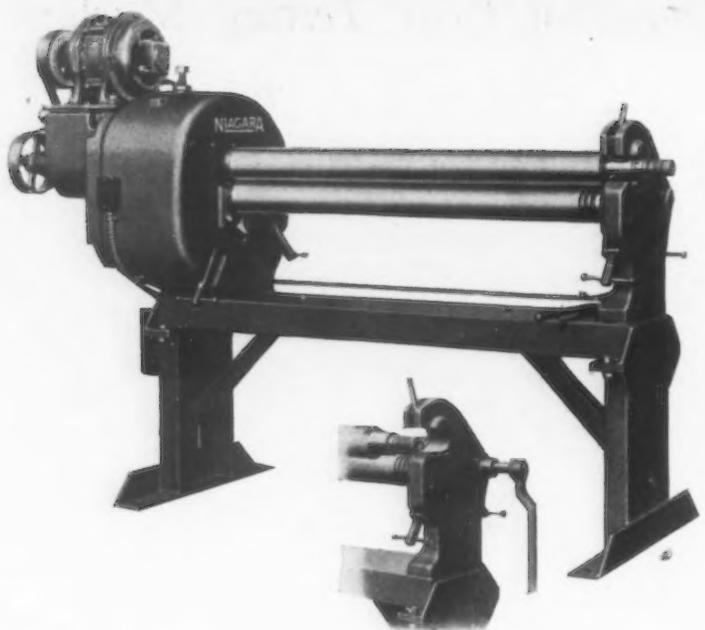
Both heads can be clamped securely in any position if a quantity of gears is to be tested.

Both spindles are mounted on matched ball bearings that are so made that when positioned on the spindle, sufficient initial load is introduced to eliminate all evidence of radial or axial deflection under ordinary operating conditions. Spindle noses are heat treated and all taper holes are ground with the spindles in place in their own bearings, thus assuring concentricity between spindle bearings and bore.

Sight oilers facilitate maintaining the correct oil level; these are constructed so that the oil is filtered before it reaches the bearings. A 3-hp. four-speed—600, 900, 1200, and 1800-r.p.m.—motor with a reverse control is used for driving the pinion spindle, the drive being through a double belt. Two sizes of pulley give the following spindle speeds: 400, 500, 600, 750, 800, 1000, 1200 and 1500 r.p.m.



Gears of various types, and up to 13 in. in outside diameter, are tested rapidly by running them together. A front view of the machine is below and a top view, at the left.



Slip-Roll Former for Sheet Metal

A NEW 4-in. diameter unit has been added by the Niagara Machine & Tool Works, Buffalo, to its line of slip-roll formers. This machine is intended for forming sheet metal into cylindrical shape. It is adapted to the manufacture of sheet-metal products and is of particular interest to manufacturers of metal specialties, steel drums, metal furniture, furnaces, blowpipe and aircraft.

Operators work at the handle end of the machine entirely, thereby reducing the time for finishing each job. The top roll does not have to be lifted to remove the finished work. This top roll is pivoted at the left end and swings forward, to permit sliding the work off the roll. It is locked in the operating position by a quick-releasing mechanism.

Three lengths of rolls are available, 36 in., 48 in. and 60 in. They can be furnished for either hand operation, pulley drive or belted motor drive.

Mechanism that frees or locks the right-hand bearing of the upper roll is controlled by a small knurled handle or trigger. Movement from the locked to the released position is simple, and allows the top roll to be quickly swung out for removal of finished work. A full bearing sleeve is provided on the movable end of the front top roll. When the roll is swung forward the sleeve accompanies it, providing complete protection to the bearing surface.

Rolls are of high-grade steel, turned and polished. Three grooves of various widths are provided at the right-hand end of the back and bottom rolls, to permit the forming of work that has an outside wired edge.

Extending across the entire length of the machine, the base is of channel-type construction, insuring permanent

alignment of rolls, bearings and housings. The machine is back geared. Maximum capacities can be rolled without reduction of speed, and all three rolls are positively driven, making possible the rolling of small diameters.

Cut steel gears are furnished, arranged in a train so that they are always in proper mesh when the upper roll is swung forward, or when the upper and lower rolls are separated for handling folded edges. The left-hand housing completely incloses the gear assembly, and has provision for easy lubrication.

Adjustment of the lower front and rear rolls is accomplished through vise-handled screws, without use of wrenches. A 2-hp., 1500 to 1800 r.p.m. motor is required.

Instrument for Testing Steel Balls and Rollers

THE entire surface of the steel balls and rollers used in ball and roller bearings may be inspected for defects in shape or finish on the Carl Zeiss testing instrument illustrated, which is being marketed in the United States by the George Scherr Co., 142 Liberty Street, New York.

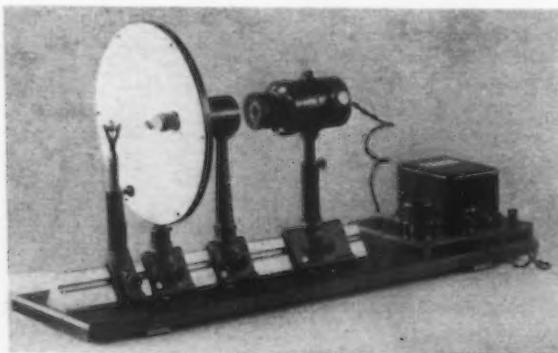
THE rays of light form an intensely bright cone in which the balls and rollers to be tested are inserted. Defects of shape or finish are quickly determined.

The light source is a 50-watt 8-volt incandescent lamp, for which a rheostat is furnished in case of direct current and a transformer for alternating current. The lamp casing is equipped with an adjustable Iris diaphragm having a 5 to 8-mm. opening. Within the beam of light issuing from the diaphragm an objective is supported, concentrating the light to a sharp point a short distance away. The rays of light will, after concentration, form an intensely bright cone in which the ball or roller to be inspected is inserted. The center of the ball should be correctly in the center of the optical axis. Small balls are placed close to the apex of the cone, and larger balls correspondingly further away, so that the entire surface is fully illuminated. The ball rests on a holder that can be rotated. In order to inspect the entire surface of the ball, the holder is turned once around the vertical axis and thereafter it is turned 90 deg. square to the optical axis.

The light reflected from the ball surface is projected on a spherically shaped screen, on which a sharply focused picture appears disclosing scratches and all other defects. Errors in shape, that is, flats, appear on the screen in form of bright spots with black margin. The balls must be cleaned previously, and should not be touched with the fingers during the test.

For testing rollers, the spherical screen is replaced by one of cylindrical shape, and the rollers tested by means of a rotating holder. The picture of the cylinder surface appears as an illuminated band, showing without distortion any deviations from the cylindrical shape. Flats are indicated in the form of bright vertical stripes. Equipment includes holders for large and small balls and rollers.

Formation of a light metals group, with the Aluminum Co. of America as the first member of the group, is announced by the American Standards Association. It is expected that the creation of the light metals group will greatly stimulate the establishment of national standards and specifications covering the processes and products of the light metals industry, which include aluminum and magnesium, their alloys, and alloys of these metals with other metals.



Taylor Society Discusses Unemployment and Industrial Coordination

THE relation of scientific management to factors contributing to the business depression was a leading topic of discussion at a meeting of the Taylor Society, held at Hotel Pennsylvania, New York, Dec. 3, 4 and 5. One session was a symposium of addresses on the possibilities of extending the technique of planning and control employed in individual enterprises to industry conceived as an organic whole. Another session dealt with technological unemployment, being featured by a paper by Paul H. Douglas, professor of industrial relations, University of Chicago.

Technological Idleness Varies with Elasticity of Industry

THE thesis that the labor dispensed with by technical and managerial improvements in industry is always reabsorbed in the expanded markets is no longer accepted without qualification, according to Professor Douglas. The capacity of an industry to reabsorb the technologically unemployed depends upon the elasticity of the demand for its product. He named three main sets of possibilities arising from increases in manufacturing efficiency:

1. The quantity of goods demanded may increase in the same proportion as that by which individual efficiency increased and price fell. This the economist terms an elasticity of demand equal to unity.

2. The quantity demanded may increase by a proportion greater than that by which individual efficiency increased and price fell. This is an elasticity greater than unity.

3. The quantity demanded may increase by a proportion less than that by which individual output rose and fell. This is an elasticity of demand less than unity.

Examples of Inelastic Demand

"In industries where elasticity of demand is less than unity," declared Professor Douglas, "we may expect, if other things remain equal, that an improvement in production will cause a displacement. This is the cause for the decline in the numbers employed in coal mining and on the railroads and in the more standardized branches of manufacturing. The demand for these commodities, as well as for agricultural products, now seems to have reached a point where it is in the main inelastic."

Professor Douglas mentioned vari-

ous qualifications and amplifications of his theory, as follows:

1. The smaller the trade division of the industry in which the improvement takes place, the greater will be the displacement of labor. For the improvement in a few operations will not, except in rare cases, lower costs and prices sufficiently to cause the quantity demanded to increase by enough to employ the same number of men in the improved processes. The same result will also occur where a plant producing a small part in an end product, such as the automobile supply factories, improves its efficiency.

But to the extent to which the price of the final article is lowered and demand increased, more men are needed in the other trades and divisions of the industry. With proper training the displaced workers may at least partially be absorbed in these other occupations.

2. The less the ratio by which total costs are reduced as labor costs fall, the greater will be the displacement of labor. For the smaller the effect of increases of labor efficiency upon cost and price, then the less will be the increase in quantity demanded and the more the workers who will have to be displaced.

3. The less the degree to which business men reduce prices as costs fall, the greater the displacement of labor. Thus if they pocket part or all of the gain, the increased profits which they receive will when spent or saved give increased employment of labor in other industries. But it will be a transfer of purchasing power which will take employment away from the industry in question. Similarly, if unit labor costs are not reduced commensurately with the increase in per capita output, prices to that extent will not be reduced and the quantity demanded will not increase as much as it otherwise would. The workers in an industry may, therefore, purchase higher money wages at the expense of displacing some of their members.

Future of an Industry Depends on Its Elasticity

"Truly good management," said Professor Douglas, "will try to lessen the pains of the transitional period through which the displaced laborers will have to go, whether by introducing technical changes as gradually as possible, by ceasing to hire workers for a time and thus allowing the working force to decrease through the natural process of attrition, or by the payment of dismissal wages to those actually squeezed out. . . .

"The future prosperity of an industry is vitally bound up with the question of what its relative elasticity of demand is," the speaker asserted.

"The automobile industry has prospered in the past because the demand for its product has been highly elastic and this has operated to fill Flint, Detroit, Toledo and Akron to overflowing. On the other hand, the depressed state of the growers of cotton and wheat and of coal mining communities is largely due to the fact that the demand for these products is relatively inelastic. An increase in production is accompanied by a more than corresponding fall in the unit price, with the result that a smaller total price is realized for a larger total volume. This means a lower than average return for labor and capital, in these industries, and, since labor and capital do not flow out of these industries automatically, a transitional period of suffering sets in, the devastating effect of which can be seen in the areas where these products are raised or mined. . . .

What Relative Elasticity Is

"Whether an industry is prospering compared with its fellow will depend upon the double relationship between (1) the relationship between the rate of change in the physical production of each commodity and the rate of change in the production of all commodities and services, and, (2) the relationship between the relative flexibilities of value of each commodity and the average flexibility of value for all commodities." (Flexibility of value is the reciprocal of elasticity of demand.)

Professor Douglas offered a formula for determining the approximate elasticity of demand for a commodity, which, if considered together with the approximate technical and managerial improvements possible for the industry, may be used to forecast probable tendencies and trends of a given industry.

The old method of measuring elasticity of demand is by dividing the relative change in quantity by the relative change in price. Such computations were further refined by Professor Schulz by correcting price data for changes in the general price level and statistics on quantities consumed by growth of the population.

"This type of measurement will be improved still further," in Professor Douglas' opinion, "if we regard the change in the quantity of a commodity

as consisting not only in the alteration of its own magnitude, i.e., more barrels of flour, tons of steel, etc., but also in the relative degree of this change as compared with the whole.

Commodities Interdependent

"I add this latter suggestion because of the fact that if the production of a given commodity remains constant while that of other articles increases, then the price of this commodity will, in the absence of other disturbing factors, rise. This will be because it is now more scarce in relation to other commodities than it was before. The production of these other commodities furnishes indeed the demand for the commodity in question and the greater it is, the more intense the demand for any product. Every wise manufacturer knows this and welcomes an increase in the production of all other industries (save those which produce articles which can be substituted), since this means more purchasers for his goods.

"The change in the value of a commodity is, therefore, affected not only by a change in the quantity of that commodity alone but also by the change in the quantity of other goods and services. In order to isolate the effect upon real price or unit value of changes in the quantity of a commodity alone, it is necessary to express this change as a relative of the change in general production."

Formula for Ascertaining Elasticity

In computing coefficients of flexibility of price for successive years, Professor Douglas first divided the "real" price or exchange value of a unit of a commodity of one year by that of the preceding year, and then divided the quotient by the quotient obtained by dividing the relative quantity of the commodity in relation to other commodities in the former year divided by the same index for the preceding year. The equation was given as follows:

$$M = \frac{Y_{a_1}}{Y_{a_0}} \quad \frac{X_{a_1}}{X_{a_0}}$$

where Y_{a_1} and Y_{a_0} = "real" price or exchange value of a unit of commodity a in years 1 and 0 respectively.

X_{a_1} and X_{a_0} = relative quantity of commodity in relation to other commodities.

The relative quantity of a commodity is computed by dividing the change in absolute quantity produced by an index showing the change in general production or the alteration of real national income corrected for price changes. Thus:

$$X_{a_1} = \frac{q_{a_1}}{q_{a_0}} \quad \frac{Q_1}{Q_0}$$

where q_{a_1} and q_{a_0} equal the quantity of commodity a in years 1 and 0 and where Q_1 and Q_0 equal the relative quantity of all commodities produced in these years or the real national

income corrected for price changes. X_{a_1} may then be expressed in relation to X_{a_0} with the latter serving as 100.

A similar method is used to ascertain Y_1 , the real price or exchange value of a commodity—its relation to the general price level.

As an illustration Professor Douglas applied his formula to pork for the years 1927 and 1928. He found that a greater increase in the quantity of pork than in the real national income was attended by a fall of 2.193 per cent in the real price or exchange value of a pound of pork.

Sees Pyramiding of Errors

In discussing Professor Douglas's paper, Sumner H. Slichter, professor of business economics, Graduate School of Business Administration, Harvard University, stated that the question is not whether the formula offered is right or wrong, but whether it has prediction value and whether it is better than several other formulas. In employing the formula one is forced to use unsatisfactory data. For example, there is no satisfactory index of the general price level—none includes rents, labor or transportation. With an uncertain general price level and a similarly uncertain national income, there is a pyramiding of computations using data that are inevitably unsatisfactory.

Speaking of the difficulty of applying the formula to a given commodity, Professor Slichter pointed out that economists distinguished between competitive goods and complementary goods. Failure to take this into account might easily lead to erratic results. A change in corn may affect beef, and vice versa.

Technological Unemployment Cumulative in Depression

Addressing himself to the general subject of technological unemployment, the speaker asserted that no one knows definitely whether there is more now than formerly, although what evidence there is suggests an increase. Increased discussion of technological unemployment is probably due to the fact that the older and less desirable workers are being crowded out and the consequences are more painful, rather than to a marked gain in labor displacements of this type.

There is no point in asserting that technological unemployment is temporary, stated Professor Slichter. A man who loses his job because of the machine may never get steady employment again in all his remaining life. Men laid off are not necessarily taken back by an industry when it expands, assuming it has elastic demand. Every industry competes with every other industry for the cream of workers.

There is an element of truth in the theory of high wages, he declared, since there is a certain balance between the amount of money going into consumer goods and going into capital goods. It is dangerous to disturb

that balance through technological change. Reductions in prices are much slower than reductions in costs from labor-saving devices. In some cases a technological improvement may create a demand for machines that adds to the demand for capital goods and the balance may not be disturbed. But it is probable that in at least half of the instances the balance will be disturbed and it should be noted that this unsettling process is cumulative in a period of falling prices. The necessity for reducing prices stimulates efforts to economize in labor. Balance is more easily restored in a time of rising prices, because advancing prices are a sort of subsidy for everyone.

Recommends United States Labor Board

As to what should or can be done about technological unemployment Professor Slichter declared that fixing responsibility is prerequisite to getting anything done and that the 200,000 manufacturers of the United States will never assume the responsibility of this problem. The greatest need, in his opinion, is a well organized labor market and that implies first of all well organized labor exchanges. A United States labor board, made up of six or seven industrialists and labor leaders, with the Secretaries of Commerce and Labor, would, in his opinion, promote orderly marketing of labor. This body should have under its control all federal labor exchanges and should also study technological advances with a view to devising plans to meet the problems resulting therefrom. Since there is no way under our constitution of requiring compliance with such plans, their acceptance by industry would depend on their fairness. Such a program, he declared, would mean applying scientific management to the marketing of labor.

In commenting on technological unemployment, Henry P. Kendall, president of the society, declared that he can see no difference between unemployment resulting from machines and chemical discoveries and that due to consolidations and increased efficiency of management. A further decline in the number employed per unit of production seems inevitable and the problem seems to have no answer. The unfortunate feature of the situation is that many workers affected are not "down-and-outs" or inefficient but have been displaced through no fault of their own.

Russia and America Compared

THE session on control of industry as an organic whole was featured by two addresses on Russia by men who have first-hand information on the five-year plan of the Soviet Government. W. J. Austin, president, Austin Co., Cleveland, which is doing large construction work in Russia, said that whatever may be one's view of Russia or Russians and their ideas and ideals, they do appear to challenge

IDEAS PRESENTED AT THE MEETING

LABOR-SAVING methods cannot be counted on to expand an industry sufficiently to reabsorb displaced workers. The extent of reabsorption depends on the elasticity of the demand for the product made.

Employees are as important a part of industry economically as plant and equipment, and business maladjustment is accentuated by displacement of labor.

A national labor board is proposed as a means of dealing with technological unemployment.

While lack of a national coordination of industry is said to be a prime cause of business cycles, the Russian experiment in government control of production and distribution is chiefly of academic interest.

The Russian plan implies the imposition of force by an autocracy.

Russia is now engaged in building industrial plants and has not yet faced the test of their successful operation. The existence of well equipped plants is not

enough, as attested by the large number idle in this country because they lack the touch of competent management.

The present stage of American industrial development is not comparable with that of Russia. When the U. S. S. R. reaches the point where it must pay attention to distribution it will meet the test confronting our country today.

Maladjustment of distribution, rather than of production, is the main challenge to American industry today.

our industrial supremacy, if what one hears has any basis in fact. The Russians at least command admiration for conceiving the greatest industrial project in history—transforming 150,000,000 people from an agricultural nation to an agricultural-industrial nation in a very short time. While Russia is lacking in skilled labor and experienced management, it doesn't have to hurdle the obstacle of large investment in plants that are not modern. It is stepping into a new scheme involving the planning, erecting and equipping of the latest and most modern plants. It is free to execute its ideas more or less untrammelled in an effort to create the highest type of industry in the world.

Standardization will perhaps be carried out to the nth degree. Production will be at capacity because production is controlled and industry is not competitive. There will be no excess capacity, certain losses growing out of competition—such as selling costs, duplication of models, styles, etc.—will be eliminated, and plant operation will be continuous, although each worker will be off every five days.

All workers are required to belong to a union because they are equally responsible with management for the successful operation of the plant. Compulsory insurance covers accidents, health, unemployment, vacation expense and pay during vacation, as well as necessary medical treatment. Incentives other than monetary have been provided, such as individual and group prizes for outstanding work.

Management is subject to criticism from the workers. Mr. Austin humorously remarked that this indicated that Russia may have some management incentives that we lack here.

So far the results of the five-year plan have been astonishing, declared Mr. Austin. Whether the objectives of the program will be reached on schedule time or are only partially realized, Russia will bear watching.

Nothing is so foolhardy as to "pooh-pooh" the efforts of others.

Good Plants Do Not Insure Competent Management

In commenting on the fact that Russia at present is engaged principally in building industrial plants, the chairman of the session, George S. Armstrong, assistant vice-president, National City Co., New York, stated that there are many fine industrial plants idle in this country because they lack the touch of competent management.

How Russia Budgets Production

Prof. A. F. Heinrichs, Brown University, Providence, R. I., who recently returned from Russia, declared that wastes due to lack of industrial organization have existed for many years and have not been dangerous because society has had no alternative. However, if the Russian experiment is successful, the alternative will no longer be Utopian but a perfectly definite one, with a going example.

The political government at the top in Russia determines policies—how rapidly it proposes to industrialize the country and how rapidly it will raise the standard of living. Industrial plans come up from the bottom. Individual enterprises report what they can produce and what they need—in a word, a one year's requisition. These separate plans are coordinated and revised in conformity with the policy determined at the top and in relation to a survey of consumer needs. After the individual plans have been reconciled on a national basis they are passed back to their original sponsors.

Russian and American Policies Contrasted

The carrying out of a national program of this kind implies control of prices, control of wages and control of exports. Since uncertain, unpredictable factors are the bane of a plan

of industrial coordination, rigid control of the foreign market is imperative.

The guiding principle of the Russian plan is to obtain the maximum production made possible by existing man power, equipment and resources. This contrasts with the American concept of limiting output to the amount that can be absorbed at a profit. Such limitation, in Professor Heinrichs' opinion, implies a static condition which, if realized, will relegate the United States from its present enviable industrial position to a place in the rear. What we want, he declared, is stability in a dynamic situation.

In an attempt to forecast the ultimate economic organization of the world, Bruce Bliven, *New Republic*, New York, declared that it is not feasible to plan the economy of any one producing nation, but that such a program must be worked out for all countries. Production and distribution of goods, he said, must be effected in a way that best suits the welfare of society as a whole, and that implies production where it is most economical, allocation of raw materials among all countries according to needs, allocation of markets for manufactured goods among manufacturing nations, control of population growth, limitation of the migration of peoples, etc.

Distribution, Not Production, Is Our Problem

To discuss what "must" be done implies the imposition of force. It must be remembered, declared Alan C. Reiley, president's staff, General Motors Export Corp., that the economic system in Russia was imposed on it by an autocratic government. Integrated correlation of all industries in this country would have to come from voluntary action on the part of those concerned.

Maladjusted distribution is the main economic problem in this country, not production. Even under the most favorable conditions there were mil-

lions of people in this country not any too well fed, too well clothed, or too well sheltered, said Mr. Reiley. The most perfect system of production and the most perfect system of marketing are incapable of serving vast numbers estopped from purchasing by poverty. For this reason large companies are organizing participating activities in the markets that they serve. A new conception—integrated distribution—has come to the fore. This means more than transportation, communication, merchandising or marketing in their old interpretations. It means the actual organization of markets.

America and Russia in Different Stages

The present problem of the United States is not comparable with that of Russia, according to Mary Van Kleeck, director, department of industrial studies, Russell Sage Foundation, New York. Russia is speeding up a program of industrialization. When it reaches the stage where it must pay attention to distribution, then, and only then, will it face some of the present American problems. American industry's production is so great that nothing is possible but the lowest priced, lowest cost service to society. We are on the eve of a new era of cooperation, such as Frederick W. Taylor prophesied in his Art of Cutting Metals. The passage Miss Van Kleeck referred to reads as follows:

We are now but on the threshold of the

coming era of true cooperation. The time is fast going by for the great personal or individual achievement of any one man standing alone and without the help of those around him. And the time is coming when all great things will be done by the cooperation of many men in which each man performs that function for which he is best suited, each man preserves his own individuality and is supreme in his particular function, and each man at the same time loses none of his originality and proper personal initiative, and yet is controlled by and must work harmoniously with many other men.

Creative Intelligence Needed

Referring no doubt to the popular impression that industrialization in this country has been largely completed, Chairman Armstrong pointed out that a large part of our population of 120,000,000 is still identified with agriculture or small enterprises. Out of 300,000 individual corporations in this country, only 1200 have capital of \$6,000,000 or over. When one considers the many products now made that were not even conceived of 60 years ago, one is forced to the conclusion that what society needs most is creative intelligence.

Employees Need Care as Much as Equipment

Paul U. Kellogg, editor, *Survey and Survey Graphic*, New York, stated that the great need is for a productive technology that will draw out the workman's capabilities in the same

thorough manner that it gets the most out of a carcass, coal or iron. Until that is done our system will be weak and incomplete. Its shortcomings are seen in instalment selling whereby the workmen's income can be mortgaged for months ahead without insuring that income.

No management would be considered deserving of the name if it started up a plant after a period of idleness with the roofs fallen in and machinery broken and rusty; yet that is exactly what is happening in industrial homes. The fact that the unemployed come back to work with savings gone, homes lost, health impaired and spirit broken has brought a realization that we must make industry steady and reemployment quicker and that we must provide some insurance against want for the unavoidably idle. Large cities are beginning to see steady work as a civic need. States are beginning to create unemployment commissions. The General Electric Co. takes the lead among large employers by setting up unemployment reserves. Yet the United States remains the only modern nation that has not worked out a plan for marketing labor, such as that proposed in the Wagner bill.

At the conclusion of this session a telegram from the President's Emergency Committee for Employment was read asking the society to make both short-range and long-range suggestions. (Concluded on page 1784)



LARGEST ROLLER BEARING YET MADE

HERE is one of twenty-eight anti-friction bearings, built for a 92 in. plate mill, which is in itself unusual from a standpoint of size. Some idea of the massiveness of the bearing can be obtained not only by comparing it with the young woman—but by noticing the bearing which she is holding and which is a popular size much used in automobile wheels, in conveyor rollers and in various automotive and industrial services.

The small one has a bore of $\frac{3}{4}$ in., an outside diameter of about 2 in., and a width of $\frac{29}{32}$ in. It weighs about 7 oz. The large bearing has a bore of $29\frac{1}{2}$ in., an outside diameter of $49\frac{1}{2}$ in., and a width of 29 in. It weighs $3\frac{1}{2}$ tons, and has a load capacity of 8,000,000 lb. at 30 r.p.m. One of the rollers alone contains enough metal by weight to make thirty-six bearings the size of the smaller one. The bearing was made by the Timken Roller Bearing Co. and to the same degree of precision as the small one, a fact which is regarded as an achievement.



Cutting Tools Discussed at A.S.M.E.

Annual Meeting

ACH class of cutting tool—carbon steel, high-speed steel, Stellite and tungsten carbide—has its place in industry, and no one of them is to be regarded as a cure-all. This conclusion is supported by data presented at the cutting of metals session, held Dec. 4 under the auspices of the A. S. M. E. special research committee on cutting of metals during the society's fifty-first annual meeting. Considerable progress has been made in the past few years in all classes of these tools, and the papers and discussion indicated that there are substantial developments in prospect.

"Tool-Steel Tools" were discussed by A. H. d'Arcambal, consulting metallurgist, Pratt & Whitney Co., Hartford, Conn.; "Cemented Tungsten-Carbide Cutting Tools," by L. J. St. Clair, Philadelphia district manager, Carboloy Co.; and "Stellite Cutting Tools," by W. A. Becker and E. E. Gordon, engineers, Haynes Stellite Co., Kokomo, Ind., and W. A. Wissler, metallurgist, Union Carbide & Carbon Research Laboratories, Long Island City, N. Y.

Better Tool-Steel Tools Available

The superior quality of the metal-cutting tools of today as compared with those of a decade ago was emphasized by Mr. d'Arcambal. Contributing factors in the development of these more efficient tools include the marked improvement in machine tools, tougher materials to machine and the demand for greater accuracy and utmost economy.

Mr. d'Arcambal took up the three factors that govern the quality of metal-cutting tools, namely, design, quality of steel used, and hardening treatment. Two of these, it was pointed out, are metallurgical problems and for this reason manufacturers of metal-cutting tools should maintain a well equipped metallurgical department.

Twist drills, reamers, taps, dies, milling cutters, slitting saws and form cutters were covered in discussing the design factor. The high-speed steel twist drill of today was emphasized as a production tool in every sense of the word; in recent demonstrations, 1-in. drills penetrated cast iron at the rate of more than 100 in. per min. and steel at more than 50 in. per min., with practically no effect on the drill point after drilling a large number of holes.

Various types of reamers were dealt with. The size cut by a reamer depends to a considerable extent upon the type of material being machined. A recent test was cited wherein holes were reamed in several different materials, using a 2-in. serrated blade reamer with a peripheral speed of 180 ft. per min. and a feed of 0.011 in. per revolution. The results were as follows: Machinery steel and heat-treated S. A. E. 6150 steel the 2-in. standard cylindrical plug gage just entered the hole; in annealed high-speed steel the gage fit was sloppy, the holes being from 0.001 to 0.002 in. larger than gage; and in cast iron and bronze the plug gage would not enter the hole.

Taps Being Run at Drill Speeds

Taps designed for work in steel will not always give satisfactory service on metals such as brass and aluminum, said Mr. d'Arcambal. Care should also be taken to see that taps designed for through-hole jobs, such as spiral-pointed taps that force the chips ahead of the taps, are not used on blind holes. Difficult blind hole jobs that cannot be threaded satisfactorily with the regular straight-fluted tap often can be tapped successfully with a spiral-fluted tap, the direction of spiral being the same as the cut. Taps of this design bring the chips out of the hole, thus preventing chipping of the threads and breakage.

It was said that in many automotive plants it is not uncommon to find high-speed steel taps being run at drill speeds.

In discussing cutters, Mr. d'Arcambal pointed out that rapid strides had been made in the past few years, due principally to the bringing out of heavier and more powerful milling machines; increased demand for parts made of heat-treated alloy steels has also been a contributing factor. Plain milling cutters for production work are provided today with a high helix angle, rake of 12 to 15 deg. or more, with just enough clearance to prevent rubbing back of the cutting edge. Helical mills of this design will take cuts of at least $\frac{1}{2}$ in. in depth in ordinary steel. Shell-and-shank type end mills today are of deep-recessed type; they have more chip clearance than previously, and, because of the large number of regrinds possible, they have considerably longer life. Inserted blade cutters with high-

speed steel blades locked in heat-treated alloy steel bodies having large bores were said to be giving remarkable service in slab milling, channeling, shoe and wedge and other jobs. Metal-slitting saws of several designs for use on different materials are being offered today, rather than the one simple design.

Form Milling Now on Production Basis

Form milling was said to have been placed on a production basis due to the introduction of spiral-fluted form cutters eccentrically relieved and provided with rake tooth form. The shearing action obtained by the spiral-flute form not only results in a longer cutter life, but also produces a smoother finish, with less strain on the machine tool. Thin pieces that would bend under the cut of straight-flute form cutters can be form milled successfully. Spiral-fluted thread-milling hobs are also giving increased speeds and feeds together with longer life between grinds.

Quality of steel used, the second factor governing the life of metal-cutting tools, was discussed at length. The majority of high-speed steel tools in use today are made from steel having an average composition of: Carbon, 0.70 per cent; chromium, 4.00; vanadium, 1.00, and tungsten, 18 per cent. Tools made from this steel, which was said to be the simplest to harden, give satisfactory service under normal conditions regardless of the type of material being machined. During the past few years, however, there has been an increasing demand for 18 per cent tungsten high-speed steel containing from 5 to 10 per cent cobalt, especially for lathe and boring tools, bits, etc. Due to the deep skin produced in hardening, tools made from this tool steel must be ground all over after hardening. Turning tools made of this high-cobalt high-speed steel were said to be giving excellent service, especially on heat-treated alloy steels and other materials difficult to machine.

No Advantages from Semi-High-Speed Steel

Of the so-called semi-high-speed steels, Mr. d'Arcambal said: From time to time the small tool manufacturer is requested to furnish semi-high-speed steel tools. A careful study of a large number of the various types of steels introduced during

the past few years shows no steel possessing the necessary properties for this purpose. Just because a low-tungsten steel tool (1½ to 2 per cent tungsten) gives a red spark when touched to the grinding wheel is no reason for expecting the tool to have high-speed steel properties. In fact, tools made from this low-tungsten tool steel cannot be run at any higher speeds, feeds, etc., than can plain carbon steel tools, and, moreover, do not possess as great toughness, due to the increased hardness penetration.

That "a tool is no better than its heat-treatment" was emphasized by Mr. d'Arcambal in outlining the hardening equipment and methods relating to small tool manufacture. Improper grinding of tool-steel tools was said to result in the ruination of many tools daily. Use of too hard a wheel, a loaded wheel, or improper cooling during grinding are contributing factors to grinding checks, soft skin and similar defects. In grinding high-speed tools, it was pointed out that some foremen are of the opinion that a straw or blue color on the tool

after grinding does not affect the performance of the tool, considering that the tool passed through that range when being high drawn. While it is true that a 1100 deg. Fahr. draw is much higher temperature than the blue color would indicate, said Mr. d'Arcambal, frequently a high-speed tool showing color after the grinding operation can be filed as readily along the cutting edges. This means that the cutting edges of the tools were heated to a temperature in excess of 1100 deg. draw during the grinding, thus ruining the tool.

Failure of many metal-cutting tools is due to the coolant used. Some machining operations, such as threading and milling, require a good grade of sulphur-base oil; other types of jobs a soluble oil; some special operations call for pure lard oil; aluminum alloy jobs, kerosene plus a small amount of machine oil, etc. The kind of cutting fluid used also has an important bearing on the finish obtained. On some threading jobs the size produced is dependent in some degree on the cutting fluid used.

exercised to prevent overheating and checking of the tools during grinding.

Successful on Cast and Malleable Irons and Mild Steel

In discussing applications of Stellite, machining was divided into four general divisions. In machining of (1) cast iron, semi-steel and malleable iron, and of (2) mild steel under conditions of considerable degree of rigidity, by which is meant that the steel casting or forging is of rigid section, the number of tools used is small, and the machine is heavy and in good condition, the Stellite cutting tools were said to be nearly always successful.

On the third class of machining, which includes operation on light steel parts on automatic or semi-automatic machines and the machining of alloy steel parts, Stellite cutting tools have met with little success. On some of the material in the fourth class of machining, namely, chilled iron, brass, bronze, aluminum alloys, hard rubber, fiber, mica and similar materials, these cutting tools were said to have come into wide use.

Specific applications were discussed under the three general headings, milling, boring and turning. Many of the jobs having been done exclusively with Stellite for a number of years, the comparison between Stellite and high-speed steel is necessarily on the basis of when Stellite was first introduced to the job, in some cases as far back as 1922. Current figures relating to the Stellite tools were also given, in all cases showing a marked increase in reduction as between the Stellite tools of then and now. This improved performance was said to be due to the development of the alloy itself and, to a lesser extent, to the improved machinery, better material to work upon and to increased knowledge and skill as to how to secure best results.

Increased Use of Stellite in Milling Expected

In milling, production figures were confined to gray iron. In the past few years, however, Stellite tools have been applied to milling steel; in connection with this it was said that there is reason to believe that application of this kind will increase greatly in the near future. A wealth of data was given on milling applications. Heavy milling of cast iron cylinder blocks is done with a depth of cut of $\frac{1}{8}$ in., speed of 110 ft. per min., feed of 10.5 in. per min., 13.6 pieces being produced an hour. Light milling of a cast-iron manifold is done with a cut of $\frac{1}{8}$ in., speed of 148 ft. per min., feed of $15\frac{1}{4}$ in. per min., 37 pieces being produced an hour.

In boring operations the rough boring of cylinder blocks was said to be the largest single item on which Stellite tools are used. Turning operations with these tools cover a larger range of work than either milling or boring. Examples of application included turning a cast iron bearing retainer, a cast iron flywheel, gear blanks made

Stellite Cutting Tools Used for Many Operations

A COMPREHENSIVE review of the properties and cutting-tool applications of Haynes Stellite was given in the paper by Messrs. Becker, Gordon and Wissler.

Stellite, a non-ferrous alloy consisting chiefly of cobalt, chromium and tungsten, was invented by Elwood Haynes, who is also credited with having built one of the first successful automobiles. Early experiments were directed toward development of a non-tarnishing alloy for use in the manufacture of cutlery. It was soon found that addition of tungsten conferred a high degree of hardness and the resulting alloys were found satisfactory as cutting tools in the Haynes automobile plant. Introduction into the machining industries progressed more or less rapidly until the war, when the alloy took an important place in the rapid production of war supplies.

The properties of these alloys vary considerably, depending upon their relative composition. Some are soft enough to be forged and rolled to a limited degree; these are used for knives and similar purposes. As tungsten is added the hardness increases, reaching the maximum in the No. 3 grade used largely for machine tools. This grade must be cast to shape and finished by grinding.

Hardness at High Temperatures a Basic Feature

Comparative strength figures, determined by a cantilever method duplicating rather closely the conditions

under which a lathe tool operates, was said to show that Stellite is weaker than high-speed steel; this is compensated for, however, in the design of toolholders and tools, and causes but little trouble in operation.

The hardness of Stellite when measured cold is not unusually great. On the Rockwell C scale it stands at 61, as against 63, the hardness of high-speed steel, hardened and drawn. When in actual use, however, the cutting edges of the tools are heated to surprisingly high temperatures. From investigations of the red hardness property, Stellite was said to be harder at temperatures of 500 deg. C and higher than any steel tool or ferrous alloy as yet examined.

The majority of Stellite cutting tools are furnished in the form of bits and blades of solid Stellite, but for certain uses a welded tool consisting of a tough steel shank and a Stellite tip is favored. Solid tools are recommended wherever possible, welded tools being used only where there is considerable overhang and when the size of the solid tool would result in extremely high costs. On production jobs tools of 1 sq. in. cross-section and less are made solid. Solid tools are more efficient. They are cast in a special manner with chilled cutting surfaces. The excessive heat of welding, in making the welded tools, destroys some of the outer chill and slightly impairs the cutting quality.

Grinding practice differs from that for high-speed steel. In addition to using proper wheels, care should be

of S. A. E. 3115 steel, an S. A. E. 1020 steel shaft and bronze bushings.

Figures covering a large number of jobs were said to indicate that use of Stellite on operations now done with steel tools will result in increased production and increased life per grind, as given in accompanying table.

	Production Increase (Per Cent)	Pieces per Grind Increase (Per Cent)
Cast Iron:		
Milling	25 to 100	2 to 5
Boring	25 to 110	2 to 6
Turning	20 to 140	2 to 5
Mild Steel:		
Milling	25 to 35	2 to 3
Boring	30 to 120	1½ to 5
Turning	15 to 125	1½ to 6

Gives Data on Cemented Tungsten Carbide

IN his address on "Cemented Tungsten Carbide as Applied to Cutting Tools," L. J. St. Clair, Philadelphia manager of the Carboloy Co., showed lantern slides of some 20 applications. These covered a variety of materials, including iron with 50 per cent steel content, chilled iron, brass, bronze, aluminum alloys, low-carbon steel, hard carbon and armor plate, the latter having been sawed by means of a tungsten-carbide tipped inserted tooth saw. Processes covered included turning, boring, planing and sawing, the tools, in many cases, working under adverse conditions of sand, scale and other highly abrasive material, as well as under intermittent or jump cutting. In all cases the life of the tool between grinds was much longer than previously and production was materially increased.

Because of its great ability to resist abrasion, cemented tungsten carbide gives longer tool life, the tool holding its keen cutting edge under severe conditions much better than any other material commercially available, states Mr. St. Clair in the paper prepared for the meeting. Then, it has been found possible to run cemented tungsten carbide tools at much higher speed than has been heretofore the practice with other tool materials. In many cases the increase in speed has been limited by the machine tool itself. The wear-resisting qualities make it possible to obtain longer runs without sacrifice of accuracy. Another important value of cemented tungsten carbide is seen in the releasing of certain alloys which could not heretofore be machined commercially.

Maintenance of Minimum Clearance Angles Important

Factors making for successful application of this material were listed as: Design of the tool; the machine tool; care of the tool in operation; and grinding. Tool design was emphasized as fundamentally a question of getting sufficient support for the tungsten-carbide tip, and at the same time allowing for the proper clearance angles. Generally speaking, the tip should be sufficiently large to withstand any strain placed upon it, and the shank should be designed to have the greatest top-to-bottom dimension possible, so as to adequately support the tungsten-carbide tip. Maintenance of minimum clearance angles is very important. In general practice a front angle of 6 deg. or less, depending upon the diameter of

the work, has been found most advantageous.

Cemented tungsten carbide will not bend or deflect without breaking. This characteristic must be kept in mind in applying these tools on any machine, and the general condition of the machine studied critically before the tool is run. First of all the tool set-up should be as rigid as possible. The machine should be in good mechanical condition and any looseness that might produce vibration or chatter be eliminated. These tools can be used on a large percentage of equipment now in use provided these machines are in, or are put in, the best possible mechanical condition. Any expense incurred in this will find justification in the good performance of the cemented tungsten carbide tools, said Mr. St. Clair.

Even with operating conditions ideal, other factors should be considered if maximum tool efficiency is to be obtained. First, it is well not to attempt to run the machine at the highest speed possible; it is better to start at a lower machine speed and accelerate it gradually. In this way it is easier to discover the critical speed at which the tool should be run on that particular application. Following such a routine will eliminate a lot of grief.

Savings Made in Not Running Tools to Death

Another precaution emphasized by Mr. St. Clair related to the running of tungsten carbide tools to death, instead of removing and honing them while they are still in fair shape. By so doing the time charge of each successive grind will be decreased, and the initial cost of the cemented tungsten carbide tool will be more easily proved in the greater number of units machined during the complete life of the tool.

Both hand and machine grinding can be used with satisfactory results. Machine grinding was said to be preferable, however, because the proper angles can be held more accurately. When grinding by hand the use of rest and angle fixtures on pedestal type grinders is strongly recommended; the tool should be constantly in motion back and forth. This minimizes glazing and keeps wheel true.

When grinding a cemented tungsten carbide tool in an automatic machine, such as a surface grinder, the down feed should not in any case exceed 0.003 in. The type of wheel to

be used depends upon the grade of cemented tungsten carbide, the stock to be removed and the finish required. Best wheel performances will be obtained at about 5000 ft. per min. The tool should not be forced against the wheel, but light pressures used and the tool moved transversely across the cutting face of the wheel. The wheel should be dressed frequently to prevent glazing. A glazed wheel causes local overheating and checks the cemented tungsten carbide. The material can be ground wet or dry; if coolant is used it should be a heavy flow.

Proper Grinding Essential to Success

The importance of grinding to the successful application of tungsten carbide tools was strongly emphasized by Coleman Sellers, 3d, William Sellers & Co., Philadelphia, in discussing Mr. St. Clair's paper. Tools of this material have been used extensively at the Sellers plant, as outlined in *THE IRON AGE* of July 3.

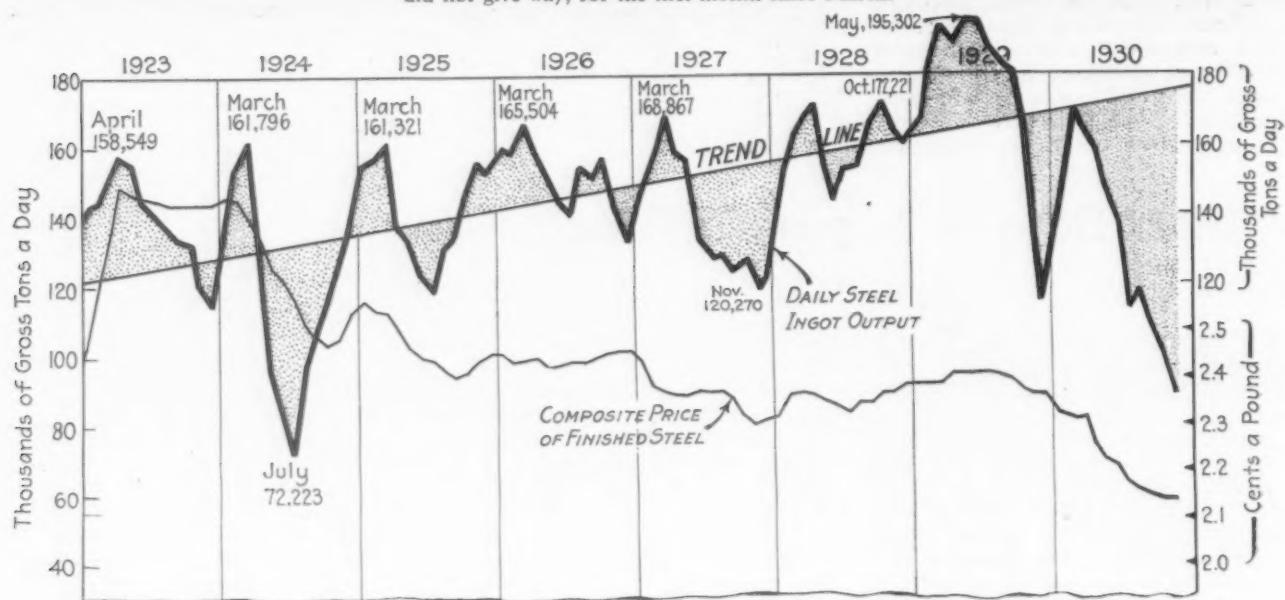
It is necessary to produce the correct angles with the clearance at a minimum for the particular material and work in hand, said Mr. Sellers. It is also important to produce a keen cutting edge free from nicks and grooves. Grinding should not be left to individual operators, but one man should be trained to grind this material and all tools brought to him. Machine grinding was said to be preferable, several reasons being given. Lapping is not essential with machine-ground tools, at least on cast iron, according to Mr. Sellers.

Analysis of a questionnaire on tungsten carbide sent out last spring by an A. S. M. E. subcommittee seems to indicate that the importance of grinding these tools had been overlooked in many cases, said Mr. Sellers.

Of 38 shops employing these tools successfully, 13 used machine-ground tools and 16 hand-ground tools; nine did not mention the method, but three of these had the tools ground outside. Eight shops reported failure or very doubtful success, and all of these used hand-ground tools. Clearance angles varied anywhere from 2 to 29 deg., with 6 deg. the most popular. Results in lapping did not indicate that it was essential. Time required for grinding tools ranged from 3 min. to 3 hr. Four companies reported average time of 5 min. per tool; four others reported about double the time for high-speed steel. The one reply covering the grinding of a milling cutter gave 4 to 5 hr. for a 10-in. cutter.

Formal discussion was also submitted by F. S. Blackhall, Jr., vice-president, Taft-Pierce Mfg. Co., Woonsocket, R. I.; A. K. Dean, American Laundry Machinery Co., Rochester, N. Y.; F. W. Curtis, research engineer, Kearney & Trecker Co., Milwaukee; J. B. Giern, Western Tool & Mfg. Co., Detroit; C. J. Schiplock, engineer of tests, Crane Co., Chicago; and Roger D. Prosser, Thomas Prosser & Son, New York.

Ingot output in November continued the downward movement, briefly interrupted in August. Prices in November, however, did not give way, for the first month since March.



Ingot Output Makes Further Drop

PRODUCTION of open-hearth and Bessemer steel ingots in the United States in November is reported by the American Iron and Steel Institute at 2,234,482 gross tons. This represents a drop of 18 per cent from the October production, which in turn was 5 per cent below that for September. Thus, the downward movement,

which has been in progress since early spring and interrupted only by the slight spurt in August, has continued further.

We are making only 63 per cent as much steel as a year ago, when November showed a total of 3,521,111 tons. The current month's output is the lowest for any month since July, 1924.

On the daily average basis, production dropped in November to 89,379 tons—again the lowest level since July, 1924, and the only month since that year which has fallen below 100,000 tons. The drop from October, on the daily basis, was 11.3 per cent.

Compared with the maximum daily figure for many months, which was that of June, 1929, with 196,118 tons, last month's output represented a little under 46 per cent.

Year's Total About 40,000,000 Tons

For the 11 elapsed months of the year the total is calculated at 37,644,765 tons, the average daily rate having been 132,087 tons. Comparing this with the average daily rate for the first 11 months of 1929, which was 179,753 tons, a decline of 26.5 per cent has been registered. With December so far showing a lower operating average rate than November, it appears probable that the year's total will fall slightly short of 40,000,000 tons.

Electric and crucible ingots are not included in these figures, nor have they been included since 1926. Last year they represented about 1 per cent of the total tonnage and averaged some 1725 tons to the working day. Adding these in, the year's total may exceed 40,000,000 tons.

Compared with October, Bessemer tonnage sustained a heavier loss than did open-hearth tonnage. In the case of the older process the reduction was more than 24 per cent, compared with a drop of less than 17 per cent for open-hearth tonnage. Both, however, made new low figures for the year and the lowest totals they have had in several years.

PRODUCTION OF OPEN-HEARTH AND BESSEMER STEEL INGOTS
(Gross Tons)

	Reported by Companies Which Made 94.27 Per Cent of the 1929 Ingots		Calculated Output of All Companies		No. of Working Days
	Open-Hearth	Bessemer	Monthly	Daily	
Total, 1928.....	40,538,657	6,591,217	49,865,185	160,338	311
1929					
January	3,692,062	549,616	4,500,131	166,672	27
February	3,590,826	489,279	4,328,713	180,363	24
March	4,180,408	596,691	5,068,176	194,930	26
April	4,025,409	640,351	4,950,053	190,387	26
May	4,275,161	707,484	5,286,246	195,787	27
June	3,999,363	622,004	4,902,955	196,118	25
6 months.....	23,763,229	3,605,425	29,036,274	187,331	155
July	3,922,053	649,950	4,850,583	186,561	26
August	3,987,400	668,023	4,939,086	182,929	27
September	3,624,954	642,886	4,527,887	181,115	25
October	3,631,674	642,235	4,534,326	167,939	27
November	2,796,214	522,672	3,521,111	135,427	26
11 months.....	41,725,524	6,731,191	51,409,267	179,753	286
December	2,375,797	360,489	2,903,012	116,120	25
Total, 1929.....	44,101,321	7,091,680	54,312,279	174,639	311
1930					
January	3,137,002	441,572	3,796,090	140,596	27
February	3,336,021	508,618	4,078,327	169,930	24
March	3,513,904	539,616	4,299,905	165,381	26
April	3,406,610	509,234	4,153,860	159,764	26
May	3,265,190	528,968	4,024,778	149,066	27
June	2,835,527	407,586	3,440,239	137,610	25
6 months.....	19,494,254	2,935,594	23,793,199	153,505	155
July	2,411,592	353,723	2,933,399	112,823	26
August	2,543,466	374,467	3,095,293	119,050	26
September	2,273,668	429,975	2,867,978	110,307	26
October	2,164,820	399,704	2,720,414	100,756	27
November	1,806,109	300,337	2,234,482	89,379	25
11 months	30,693,919	4,793,800	37,644,765	132,087	285

Manganese Ore a Continuing Cause of Political Agitation

WASHINGTON, Dec. 9.—The American Manganese Producers' Association has lately been making special efforts to prohibit the importation of manganese ore from Russia, a material that has met a considerable portion of the requirements of the American steel industry. The domestic manganese lobby claims that Russian manganese ore is being "dumped" in this country in violation of the anti-dumping act, also that manganese ore is produced in Russia by convict labor and therefore forbidden entry into this country if the charge that convict labor is used can be sustained.

The burden of proof is now upon the importer, for the Treasury Department has issued new regulations that make it incumbent upon the importer to swear or affirm that the goods received are not produced by convict labor. The domestic manganese producers are already pressing this advantage, and within the near future a test of the regulations, as affecting manganese ore, is to be expected.

Oddie Bill Would Bar All Russian Imports

The American Manganese Producers' Association is regarded as the inspiration behind the bill introduced on Dec. 2 by Senator Oddie of Nevada, an outspoken advocate of the domestic manganese cause, to prohibit the importation of any article or merchandise from the Soviet Union. Here is the text of the Oddie bill:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the transportation into the United States, or any territory subject to the jurisdiction thereof, of any article or merchandise from any territory subject to the jurisdiction or control of the government of the Union of Soviet Socialist Republics, mined, produced or manufactured wholly or in part in any such territory, or produced or manufactured from materials, any of which have been mined, produced or manufactured in any such territory, is prohibited. The Secretary of the Treasury is authorized and directed to prescribe such regulations as may be necessary for the enforcement of this act.

May Not Be Acted Upon at This Session of Congress

It does not seem likely that the Oddie bill can be passed at this short session of Congress, even if it can be passed at all. However, its introduction shows the lengths to which the domestic manganese producers are prepared to go to attain their ends. Undoubtedly some members of this



association are actuated by a sincere desire to develop a manganese ore supply in the United States, but the extremes to which the proponents of the idea have gone to persuade Congress and bureau officials at Washington of the justness of their course have rather overshot the mark.

A good many of the Senators and Representatives from the Western States have definitely lined up with them, and a spirited fight over the Oddie bill is promised at the next session of Congress, if not at this one. One of their adherents is Senator Borah, but he has openly declared himself in favor of the recognition of the Soviet government and he may not lend himself to a project that would bar Russian products from this country.

Moreover, such a move probably would incite widespread opposition from many manufacturers who have been enjoying a substantial volume of business from Russia and who have extended credit terms over a year or longer to the Soviet buying representative in this country, the Amtorg Trading Corp.

Whatever may be the views of individuals, manufacturers or others as to the political or economic wisdom of selling to the Soviets, the fact remains that a huge trade has been built up with the tacit approval of the Government at Washington, and even with official sanction, and Congress will not lightly put a spoke in the wheel of such complicated international machinery. Even though such action might be extremely unpopular at any time, it would be doubly so now when manufacturers in the United States need all the business they can get to keep their own wheels moving and to give as much employment as possible to labor.

It is not doubted that President Hoover would veto any bill to prohibit our trade with Russia, even if

such a bill could be passed through both houses of Congress.

Russian Purchases Many Times Sales to United States

The importance of Russian trade to the United States is well illustrated by the figures. First of all, Russian imports amount to only 0.6 per cent all goods brought into the United States. During the fiscal year ended June 30, 1930, the Soviet Union ranked ninth among importers of our goods, according to the Department of Commerce, and it was twenty-ninth among exporters to the United States. During the Soviet fiscal year ended Sept. 30, last, the total purchases from the United States were \$149,223,000 and total sales to this country were \$31,017,000. These are the official figures of the Soviet government, but they are borne out by the records of our own Department of Commerce.

American Iron and Steel Institute Files Brief

As to the Russian manganese ore situation, the American Iron and Steel Institute has stepped into the picture to refute some of the claims of the American Manganese Producers' Association and to preserve the status quo in the importation of ore from abroad.

Thomas J. Doherty, counsel for the steel institute, filed a brief on Monday with the Bureau of Customs, Treasury Department, Washington, answering that portion of the complaint of the American Manganese Producers' Association that Russian manganese ore is being "dumped" in this country. He suggests that the complaint of dumping is not a bona fide complaint at all, but that "it is urged and is being used for some ulterior purpose." The brief says:

"The same representations as to the condition of the domestic manganese industry which were made to the committees of Congress in 1929 and 1930 in an effort to secure an increase of 50 per cent in the duty on manganese ore . . . are now utilized in an attempt to show that said condition is caused by the dumping of manganese ore from Russia."

Asserting that there has been complete failure on the part of the American Manganese Producers' Association to furnish any proof of charges of dumping, the American Iron and Steel Institute states that "there is no dumping of manganese ore into this country from Russia or any other

country, and that all allegations to the contrary are unfounded in fact."

Russia a Leading Supplier of Manganese Ore for 50 Years

No significance attaches to the fact that our imports of Russian ore are large, the institute says, that country having been a major source of supply for manganese ore used in the United States for more than 50 years. The steel institute says that the estimates of the domestic manganese producers that the total importation of manganese ore in 1930 has been 742,000 tons, of which 346,178 tons is the amount to be furnished from Russia, are "greatly exaggerated," as the official figures for the period ended Oct. 31, 1930, was 507,683 tons, of which 205,089 tons come from Russia.

The brief quotes figures taken from the publications of the Department of Commerce showing domestic production and importations from 1904 to 1929, inclusive, as follows:

Manganese Ore		
	Domestic Production, Gross Tons	Imports, Gross Tons
1904	3,146	108,519
1905	4,118	257,033
1906	6,921	221,260
1907	5,604	209,021
1908	6,144	178,203
1909	1,544	212,765
1910	2,258	242,348
1911	2,457	176,852
1912	1,664	300,661
1913	4,048	345,090
1914	2,635	283,294
1915	9,613	313,985
1916	31,474	576,321
1917	129,405 [†]	629,972
1918	305,869 [†]	491,303
1919	54,957	333,344
1920	94,420	606,939
1921	13,531	401,354
1922	13,404	363,975
1923	31,500	339,536
1924	56,515	540,065
1925	98,324	681,395
1926	46,258	692,108
1927	44,741	682,120
1928	46,860	637,258
1929	60,379	664,269

*Domestic production includes all ore over 35 per cent manganese and includes both chemical and metallurgical grades of ore.

[†]The war production during 1917 and 1918 was obtained at an inflated price nearly seven times the normal price. Even in the face of this high price manganese mining was conducted at a loss and Congress enacted the "War Minerals Relief Act" under which the manganese miners' losses were reimbursed by the Government to the extent of \$2,506,112.36."

Contribution of American Mines Small Part of Consumption

These figures bear out a point that has been commented upon editorially by THE IRON AGE, namely, that in the past four years—1926 to 1929—198,238 tons of manganese ore, of which 133,000 tons was metallurgical ore (manganese 35 per cent minimum) was taken from domestic mines. Thus, the contribution of American mines in these four years to the total was less than 7 per cent.

Cutting off Russian imports, the American Iron and Steel Institute contends, would not necessarily help the domestic industry because the other manganese-producing countries—Brazil, British India, the Gold Coast and, of late, Rhodesia—have enormous deposits of the necessary grade for conversion into ferromanganese and, even if the Russian ore were cut off,

there would be no diminution of importations.

The American Iron and Steel Institute concludes its argument against the contentions of the American Manganese Producers' Association by refuting the statement of that organization that the steel industry has purchased manganese ore abroad at a time when it might have purchased domestic manganese at lower prices. This statement is said to be untrue.

"No one can believe," says the brief, "that American business men in a highly competitive industry would pay any more than the market price for any article or material no matter where it came from." This statement is, furthermore, held to be inconsistent with the repeated claims of the domestic manganese producers that they must have a higher duty because foreign prices are lower than the domestic.

Taylor Society Discusses Unemployment

(Concluded from page 1782-D)

tions for the alleviation of unemployment. A tentative resolution covering short-range suggestions was discussed.

Industrial Code Presented

AT one session the society's Committee on an Industrial Code, Morris L. Cooke, chairman, presented a preliminary draft of a code of employer-employee relations for discussion. Security of employment was mentioned as one of management's major objectives. A guarantee of employment for a specified number of months in the year and provision of funds to make payments to workers for whom employment is not provided for the guaranteed period was recommended as a practice worthy of study by all industries. Sudden termination of employment, without warning, was condemned and a compensation wage for employees unavoidably displaced was advocated. The setting of an upper wage limit for hiring workers was decried because of its harmful social consequences.

Election of Officers

Henry P. Kendall, president of the society since 1928, was reelected. Mr. Kendall is president and treasurer of the Kendall Co., Boston. Arthur T. Davenport, director and general manager, Sweet Orr & Co., New York, was elected vice-president; Edward W. Clark 3rd, member of the banking firm of E. W. Clark & Co., Philadelphia, was elected treasurer. Dr. Harlow S. Person is managing director of the society.

Buffalo Bolt Co., Buffalo, is now supplying bolt and nut cartons with a new type of label. Standard colors are adhered to, but the design of the new label is such that it can be easily read at a distance, even in semi-darkness. Sizes are prominently marked, also the type of bolt.

Are Restrained from Using Imitative Business Names

WASHINGTON, Dec. 9.—Simulation of the names of prominent manufacturers must be discontinued by L. A. Crancer and G. B. Fleischman, St. Louis, who do business in pipe and pipe fittings, according to an order of the Federal Trade Commission. The order directs Crancer and Fleischman to cease and desist from employing any trade name or company name which simulates the name of the Allegheny Steel Co., the Erie Iron & Steel Co., the Illinois Steel Co., the Westinghouse Electric & Mfg. Co., Pittsburgh Valve & Fittings Co., National Plumbing Supply Co., or of any company with which the respondents may now or in the future be in competition in the sale of pipe fittings. The order also prohibits representation by Crancer and Fleischman that they are manufacturers or operate mills, when, the commission announced, such is not the fact.

The order specifies the following names under which Crancer and Fleischmann traded as those not to be used by respondents in the sale of their commodities: Allegheny Tube & Steel Co., Erie Iron & Tube Co., Illinois Steel Products Co., Westinghouse Union Co., Pittsburgh Malleable Fittings Co., and Plumbers National Supply Co.

Bullard Co. 50 Years Old

Fifty years ago Edward Payson Bullard, a recognized genius in machine design, founded what is now universally known as the Bullard Co., Bridgeport, Conn., by the establishment in 1880 of the Bridgeport Machine Tool Works. In 1894 the company was incorporated as the Bullard Machine Tool Co., and in 1929 the name was changed to the Bullard Co.

The company has a brilliant record of 50 years of progressive achievement in the design, development and manufacture of machine tools. To commemorate the anniversary, the company has placed a portrait in oils of the founder and bronze tablet in the lobby of the new administration building.

Saul Frankel, Rochester Iron & Metal Co., Rochester, N. Y., has been elected president of the Buffalo chapter of the Institute of Scrap Iron and Steel, Inc. Sloan Hurwitz, Hurwitz Bros. Iron & Metal Co., Buffalo, is chairman of the executive committee.

A booklet under the title of "Fastenings—How They Are Made by Leaders in the Metal Working Industries," being issued by the Parker-Kalon Corp., 196 Varick Street, New York, presents a large amount of data secured by independent engineers in co-operation with radio, electric range, refrigerator, metal furniture, airplane and other manufacturers in the metal-working field.

Steel Advance Calculated to Improve Sentiment

BY LEWIS H. HANEY

DIRECTOR, NEW YORK UNIVERSITY BUREAU OF BUSINESS RESEARCH

ADVANCES in the prices of bars, shapes and plates are to be regarded as an experiment in business "stabilization." The movement means more, too, than previous efforts to drive in buying for an ensuing quarter. Underlying, there is the hope that it will serve as a restorative to public confidence and, along with the advance in copper prices, introduce stabilization in the general price level.

As an experiment and as a carefully considered step, we may wish it well and consider it sympathetically. But such advances in prices for the next quarter have not always been maintained, and we may consider whether existing conditions favor this one.

Favorable Indications

First, we note that steel prices are low and that several steel companies are not earning their dividends (at least four have recently omitted dividends on their common stocks).

Second, there are some signs of stabilization in raw material prices, as, for example, the fact that few, if any, basic commodities have recently been making new lows, although the average has been declining.

Third, the recession in general business has gone so far and lasted so long that there is good precedent for an opinion that it may be near bottom.

Fourth, a part of the backwardness in steel buying is undoubtedly due to hesitation, based on the psychology of a declining market. Some buyers are merely waiting for the bottom. And it

may be added that the offensive-defensive of announcing an advance instead of merely stabilizing, is much the more effective course.

Fifth, the widespread desire to maintain wage rate schedules, as a supposed means of encouraging business revival, adds to the appeal of a price advance on steel.

On the other hand, there may be certain doubts as to the effectiveness of advancing the price of heavy rolled steel at this time, as follows:

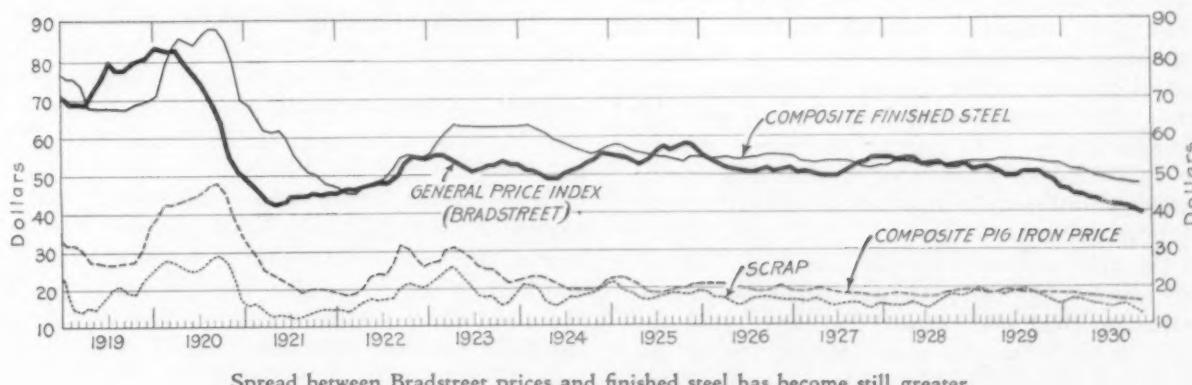
Unfavorable Factors

(1) The price of bars and the average price of finished steel, while *absolutely* low, are high in comparison with the general level of commodity prices. The Bradstreet index ($\times 4\frac{1}{4}$) is \$41.79, and finished steel averages \$47.82 a ton. Normally, as judged by the experience of the past 30 years, the figures should be about equal.

(2) Sustained increase in the demand for steel is doubtful. Activity in building and railroad transportation is low, and no definite indications of an expansion therein during the next few months are apparent.

(3) The general trend of commodity prices, including raw materials, is still downward, the Bradstreet index having declined to a new low level as of Dec. 1.

It cannot be dogmatically asserted that the experiment is not worthwhile. Its success, however, depends not only upon the holding power of steel producers, but also upon the development of a *sustained* demand and upon the general trend of business.



Spread between Bradstreet prices and finished steel has become still greater.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

(ESTABLISHED 1855)

Unduly Alarmed Senators

FOR announcing an increase of \$1 a ton in the price of plates, shapes and bars for first quarter delivery, Senator Norris wants the Department of Justice to investigate steel companies. One company made the announcement first. Others followed with similar action. Ergo, the Nebraskan sees a violation of the antitrust laws. And the "facts make out a possible case of a conspiracy to fix prices when it may be detrimental to the public interest to do so," in the eyes of Senator Walsh of Massachusetts.

It is not "patriotic," say the senators, for steel manufacturers to announce an increase in price in the face of the "vast amounts" of steel that will be required for the public building program. The industry could well wish for the early release of a fraction of the vast amounts. Then might the dollar advance be well established, and the way be paved for the recovery of part of the \$5 to \$6 drop in price of the past year. The whole inference of conspiracy is so ridiculous that we feel apologetic to discuss it.

Senators Norris and Walsh do not yet realize of course that it is the industrial executives of the country who are taking the leadership in the attempts to stem the sweep of the depression. They do not appreciate the psychology back of the efforts to stabilize. They do not know that the whole industrial fabric wants some certainty instead of chaos. It has not occurred to them that unanimity of action is not difficult if it promises to check the mounting losses of business. Collusion, let alone not being thought of, is not even necessary under existing circumstances.

Whether the stiffening of the selling attitude will revive the continuously drooping volume of steel demand remains to be seen. Knowing the worthiness of the purpose back of the move THE IRON AGE believes that it was well worth trying. Surely there was need on the side of profit making. Not more than two steel companies probably will have earned their common stock dividend this year. At least one large steel company will not earn its preferred stock dividend. One company has been forced, probably by financial interests, to reduce wages and salaries 20 per cent, although wage rates in general are being rigorously maintained in the face of operations the lowest since 1921.

As the price action is a repetition of an old and natural practice of the steel and other businesses, the suspicion will not down that the senatorial harangue is an effort to make capital out of the present public state of mind. Meanwhile, the President's recommendation for an emergency fund of \$150,000,000 to speed public construction and give employment to needy workers is promptly met with "pork barrel" proposals. And of course there is no

conniving when the Federal Farm Board, or the Department of Agriculture or even the senators themselves broadcast the gospel that farmers should curtail crops so they may obtain increased prices.

We doubt that the steel consuming trade is other than one with the steel makers that the senators were indulging in tirades for political effect and the harvesting of votes.

Steel Tonnage This Year and Next

WITH the report of Bessemer and open-hearth steel ingot output in November issued, an estimate of the calendar year's total involves only an estimate of Bessemer and open-hearth for December and of crucible and electric for the year. As for December, opinions vary as to the extent of the further decrease and it may be as well to have recourse to arithmetic. Daily average tonnage has decreased from the preceding month as follows: September, 7.3 per cent; October, 8.6 per cent; November, 11.3 per cent. Assuming 10 per cent decrease this month from last would make 2,090,000 tons of Bessemer and open-hearth for the month and 39,735,000 tons for the year. The proportion of electric and crucible ingots, not reported monthly, has been increasing, and last year electric and crucible equaled 0.99 per cent of Bessemer and open-hearth. Assuming 1 per cent, this year's total of all ingots would be 40,132,000 tons.

The year's total production therefore comes out nicely at a round figure of 40,000,000 tons, with a little more chance of the final figure being above than below that amount. Distribution through the year was also in easily remembered figures, slightly over 12,000,000 tons in first quarter and slightly under 12,000,000 tons in second quarter, making 24,000,000 tons in first half, just about 9,000,000 tons in third quarter and probably a little over 7,000,000 tons in fourth quarter, making 16,000,000 tons for second half.

The forecasters for 1931 will be unable to make comparisons with this year as a whole because this year has been made up of such different parts. There has been no year for which there are statistics or definite recollection in which the second half was anywhere near one-fourth below the first half. The biggest drop occurring recently, in 1927, put the second half 18 per cent under the first half. Nor it is the usual thing for the fourth quarter to run under the third quarter, while this year it is doing so by probably more than 20 per cent.

A comparison of 1931 with 1930 as a 40,000,000-ton year would mean nothing, nor would a comparison with the first half of this year when that had a 48,000,000-ton rate. A comparison with this quarter's

28,000,000-ton rate, on the other hand, would suggest that next year cannot avoid doing better.

A year ago predictions were made that 1930 would be "a good average year" in steel. The first half of this year bore out those predictions. Comparison is properly made with the first half of other years. Up to 1926 no first half had shown 24,000,000 tons, though 1923 came close to it with 23,300,000 tons. Then 1926 and 1927 showed just a full 24,000,000 tons, 1928 showing 25,000,000 tons and 1929, admittedly an exceptional year, a little over 29,000,000 tons.

The second half did not "carry on," but steel men have never had much confidence in views extending beyond six months. They have erred on the other side sometimes. In February, 1928, there was much doubt as to the second half of that year and later on there was no little price cutting as practical evidence of such views, yet the second half of 1928 made the very unusual showing of running above the first half.

Apparently the best way to view things now is that the bad news is all out, with a full impress upon the rate of steel production, leaving room only for improvement. In this department of *THE IRON AGE* of Oct. 30, percentage increases of January over December were given for the last nine years, making rather a formidable showing. Increases ranged from 3.6 per cent when December had been good to 26 per cent when December had been poor, the nine-year average being 13 per cent. These figures give a basis for surmise at least.

Japan Looms as Exporter of Steel

JAPANESE pressure for steel orders in foreign consuming markets is commanding increasing attention, not because of its present importance measured in tonnage, but rather on account of its forebodings of keener competition for Far Eastern business in the not distant future.

A decade ago Japan exported twice the tonnage of steel shipped abroad in 1929, export trade in 1919 reaching a total of 55,245 metric tons, compared with 25,501 tons last year. Ten years ago, however, much of the exported steel from Japan was of foreign origin, while today it is of Japanese manufacture. The total raw steel output of the oriental empire last year was 2,293,840 metric tons.

As the country has grown industrially, demand for steel has increased, and with normal business conditions today most of the Japanese production could be consumed domestically. The depression of the past year, however, has turned the attention of Japanese steel mills to export markets in the Far East and, aided by the Government, exporting has been stimulated as a temporary outlet for tonnage. But Japan has made, and is still making, rapid strides in expanding steel-making capacity, and producers foresee the time when permanent outlets for an exportable surplus of steel products may be needed.

Early in 1930 the International Tube Cartel received a jolt in the appearance of Japanese black and galvanized gas tubing in China at prices considerably lower than the minimum fixed by the cartel members. Until a few years ago, Japan was a substantial importer of British and American tubing for the gas companies of its principal cities. While this entrance

into the export market was caused by lack of domestic demand, Japan, with advantageous freight rates to Far Eastern consumers, is not likely to abandon the trade it has won.

Another field of expansion in exports is in rails. The Government Steel Works has almost obtained a monopoly of the domestic rail business, much of which formerly was placed with American and European mills. This year, with the Japanese railroads curtailing expenditures because of poor business, the Government works has been seeking foreign orders. Members of the International Rail Makers' Association were much concerned last June when the Japanese producer appeared as a bidder on a tonnage of heavy rails for the Egyptian Government. Thus far, the rail exporting efforts of the Japanese have failed to result in the booking of any considerable tonnage, but the capacity is available and in the Far East the freight rate advantage is ever present. Certain foreign users of rails have placed trial orders in Japan and the award of a substantial contract would not occasion much surprise.

In galvanized sheets, Japanese efforts to export have been rewarded with good fortune, as a result of the unsettled political situation in British India. To Japan's small normal trade throughout the Far East has been added a sizable tonnage from India, which has been turning to sources of supply other than Great Britain. The Calcutta representative of the Japanese Export Galvanized Sheet Manufacturers' Association estimates that total exports of sheets to India this year may reach 50,000 tons.

Recently American and Continental producers of cast iron pressure pipe competed for about 8000 tons in the Dutch East Indies, but at the opening of tenders a Japanese maker was low bidder and was awarded the contract. Japanese pig iron from Manchuria is being shipped to Czechoslovakia, and Germany has bought Japanese copper in recent months. In 1929, Japan was Germany's best customer for rolling mill and other steel plant equipment, buying about \$18,000,000 worth, and this year purchases from Germany are expected to exceed the 1929 total by about \$5,000,000, as Japan adds to capacity for production of wire rods, sheets, rails and other products.

While Japanese steel and iron export trade is still limited, the driving force increasing steel production in Japan is by no means spent and next year is likely to see a further expansion of the foreign business of the island empire.

Engineers in Arts and Art

TWO notable features marked the program of the annual meeting last week in New York of the American Society of Mechanical Engineers. One of these was the recognition of the engineer as a human being of many-sided interests and the other was the staging of sessions devoted to the current human problem in industry, that of unemployment.

By a happy thought someone conceived that some attention might well be paid to the avocations of the engineer in the fields of art. The result was an exhibition of sculptures, paintings, drawings, etchings and the like, that was surprising in quality and scope and in number of participants. The formal opening of the exhibition was preceded by a musical program of

salon music, likewise the rendition of three engineers, Messrs. Greiner, Hovey and Modjeski, conspicuous in bridge engineering. It is believed this was the first exhibition of art by engineers and at any rate it opened up a new avenue of acquaintanceship among engineers of this and other societies.

Discussions on stabilization of employment were the other feature. It cannot be said that they achieved any formula for finding our way out of the present difficulties, but they brought an acceptance in a measure by the engineers of much responsibility for continuity of employment. Economists joined in the deliberations, which were prolonged and intensive. The undercurrent of the economists' views was that perhaps it were well had wage rates been allowed to move downward along with commodity prices, but the true note of the sessions was overwhelmingly for continuing the experiment of sustained high wage rates. It was a meeting which discussed palliatives rather than cures, but it was a timely topic properly to be considered by the management engineers of the "society of the industries."

CORRESPONDENCE

Says Retail Prices Have Responded

To the Editor: In THE IRON AGE for Dec. 4, you have an editorial entitled, "Looking for Lower Retail Prices."

Obviously, the retail price of food has not declined in the same proportion as the wholesale price, but the merest tyro in economics knows that between the farmer and the consumer there are numerous charges of a more or less fixed nature, such as rent, real property, taxes, transportation, depreciation, interest, etc., and variables such as labor, advertising, credit losses, etc. If all of these intervening charges were to be reduced in the same proportion as the decline in raw materials it is very evident that we would face economic depression far more serious than we have yet witnessed.

What is true with respect to food products is likewise true in greater or less degree for many other types of products. We cannot expect finished steel prices to reflect the same decline as the heavy melting scrap and pig iron; we cannot expect rubber tires to sell at a price representing a proportional decline in crude rubber and cotton; we cannot expect clothing prices to decline in the same proportion as raw wool.

Retailers, generally, are not unmindful of the wisdom of taking price reductions quickly. The experiences of 1920 and 1921 taught them that large inventories are dangerous, and since those years retailers have operated with small inventories and rapid turnover.

If the turnover does not come quickly, the prompt remedy is swift and drastic price reduction. Very often these reductions today bring the retail price far below the current cost of replacement.

In an effort to ascertain how well retail prices at Macy's reflected changing wholesale costs, we compiled a list of prices for some 269 staple and semi-staple items. Using September, 1929, prices as a base to equal 100 per cent, the wholesale and retail indices were as follows:

	Wholesale	Retail
Sept. 1, 1929.....	100	100
Jan. 2, 1930.....	89.9	87.9
Mar. 1, 1930.....	87.9	84.2
June 1, 1930.....	86.5	83.8
July 1, 1930.....	84.0	81.3

There are, of course, special reasons why Macy prices

reflect changes in the wholesale markets very quickly, but what is true with respect to Macy is also measurably true for many other retail businesses.

Modern retailing is a highly competitive business and it is illogical to assume that under the conditions which have existed since the debacle of 1929, retailers have not generally passed on to the consumer the benefits of lower wholesale prices. In fact, there is abundant evidence that these reductions have been made very promptly—far more promptly than your editorial infers.

Probably the real truth is that consumers who are still employed are not buying freely for they are afraid that tomorrow they may be out of work. When that fear is present, low prices do not promptly stimulate increased buying, consequently, the process of creating shortages in desirable merchandise has been retarded. Nevertheless, this process is now under way and furnishes ground for the belief that improvement in general business may not be as far ahead as many pessimists would have us believe.

Meanwhile, it is helpful to point out the greatly enhanced buying power of the retail dollar. It is sound policy to urge consumers to buy merchandise at current low prices and it is of equal importance to urge business men everywhere to take advantage of present bargain prices for raw materials. Only a small increase in such buying will bring early improvement in prices of raw materials and finished products. If we are to defer buying until retail prices reflect declines proportional to the declines in raw materials, the world can look forward to far more serious economic troubles.

In the interest of constructive journalism, is it not time to aid in dispelling the economic fog which has caused business men everywhere to lose faith in the consumptive abilities of 120,000,000 people?

Q. FORREST WALKER,
Economist, R. H. Macy & Co.
New York.

Foundry Construction and Foundry Practice

To the Editor: On page 1683 of THE IRON AGE, Dec. 4, 1930, there is the following statement in connection with the article on the Lebanon Steel Foundry:

What is regarded as a new principle in foundry construction was adopted—the layout for an established foundry practice was made and the new buildings erected around it.

It is the writer's judgment that this statement is not quite correct. For example, the Council Bluffs Foundry of the Griffin Wheel Co. was developed in just this way nearly ten years ago. It is likely that foundry designs were developed in a similar manner even before that time but, during the past ten years, many foundries, too numerous to mention, have been built by setting up first the foundry practice, then the material handling system, and lastly, by designing buildings merely as inclosures to permit the adopted practice to be carried out and to house the required equipment.

As an outstanding recent example, I suggest the Buick foundry of the General Motors Corporation, which was designed about three years ago and which, when constructed, was the world's largest gray iron foundry under a single roof. Two years ago we witnessed the construction of the Chevrolet foundry of the same corporation, which is now the world's largest gray iron foundry. A yet more recent example, which was planned earlier than the Lebanon foundry, is that of the General Steel Castings Corporation at Eddystone, Pa., which, as has been pointed out in an article in one of your recent issues, has been developed entirely around a preestablished practice.

S. GERTZ,
Sales manager,
C. O. Bartlett & Snow Co.
Cleveland, Dec. 5.

Favorable Developments Feature Iron and Steel Trade

THE week's developments in iron and steel have been preponderantly favorable and the industry, although chastened by repeated disappointments during the year, has gained confidence. While steel ingot output in November declined to the lowest level since July, 1924, and some further recession this month seems inevitable, there has been a gradual gain in demand for forward delivery, strengthening expectations of an upturn in production early next year.

The unfilled tonnage of the Steel Corporation undoubtedly increased in November, possibly by as much as 150,000 tons. A leading independent maker of sheets has had a better volume of orders in the past three weeks than for any similar period in several months. Although improvement in business has been slight in some cases and has not extended to all products, the trend now seems to be definitely upward.

This tendency has been given impetus by last week's advance of \$1 a ton on plates, shapes and bars for first-quarter shipment. Specifications against fourth-quarter commitments have been stimulated, especially for deliveries in January. At the same time first-quarter contracts for these products, as well as for sheets, are beginning to be closed. Some consumers, in fact, are trying to buy sheets through the first half of 1931.

RAIL contracting, which ordinarily gets into full swing in October, now gives promise of getting under way without further delay. The New York Central has put out a formal inquiry for 170,000 tons, or 45,000 tons more than expected, and will also enter the market for 25,000 tons of splice bars. The Pennsylvania's inquiry for 200,000 tons of rails will be issued this week. The two months' postponement of the bulk of rail and track accessory buying will concentrate demands that otherwise would have been spread over a longer period.

A large part of the domestic tin plate contracting for the first half of 1931 has been completed. Tin plate requirements of can manufacturers have been consistently gaining 10 per cent annually and this rate of increase is expected to be maintained next year.

STRUCTURAL steel shows greater activity. Awards, at 53,000 tons, are heavy, while new projects, totaling 91,000 tons, are the largest since early in November.

Pipe lines, which have taken much steel in the past year, promise to give the mills renewed support. Three gas lines, now before the trade for figures, call for a total of 1000 miles of pipe, requiring 110,000 tons of steel. Another sizable inquiry is in early prospect.

▲▲▲
TIN PLATE Contracting,
Greater Activity in Struc-
tural Steel and Large Pipe Line
and Rail Inquiries Hearten In-
dustry
▼▼▼

The automobile industry is buying more steel, although its output in December is likely to fall below the poor record of November and definite indications of a marked upturn in January are still lacking.

STEEL ingot production is estimated at 38 per cent, against 39 per cent last week, with the rate of the leading interest probably three or four points higher than the general average.

Price developments of the week have all helped to clarify the market situation and thereby to promote stability. Efforts of producers of late have been to find a basis of stabilization that represented the actual bottom of the market. Thus wire rods have been reduced \$1 a ton and plain wire \$2 a ton from recent nominal quotations. The same policy was followed recently in the case of strips and sheets, on which first-quarter quotations generally represent minimum selling prices.

A SUCCESSFUL stand at given price levels naturally encourages advances, and that is exactly what happened in the case of bars, plates and shapes. The step taken by the leading interest a week ago has been followed by independents and has been well received by consumers, who welcome a definite halt to the continued sagging of prices that characterized the market throughout most of the year. The determination of mills to bolster the market was strengthened, no doubt, by mounting costs, which at 40 per cent output are \$3 to \$5 a ton higher than at reasonably full operations.

PIG iron contracting continues active at New York and Chicago, and is getting under way at Pittsburgh. At Chicago, bookings this month promise to be among the best of the year.

Ferromanganese has been reduced \$14 a ton for 1931 delivery to \$85 a ton, seaboard, for lots ranging from a carload to 999 tons. The scrap market is quiet and irregular. Heavy melting grade is unchanged at Pittsburgh, Chicago and St. Louis, and there have been advances in railroad specialties at Pittsburgh and a few items at St. Louis. At Cleveland and Philadelphia heavy melting steel is off 50c. a ton and at Buffalo \$1 a ton.

THE IRON AGE composite prices of finished steel and heavy melting scrap have reached new 1930 lows. Finished steel is 2.121c. a lb., or \$2.46 a ton above the low of the 1921-1922 depression, reached in February, 1922. Heavy melting scrap is down to \$11.25 a ton, which is 25c. a ton above its low point of July, 1921. The pig iron composite is unchanged at \$16.02 a ton, also a 1930 low.

PITTSBURGH

Consumers of Steel Taking More Interest in First Quarter Needs

PITTSBURGH, Dec. 9.—Improvement in business sentiment, inspired largely by increasing consumer interest in first quarter steel needs, is generally evidenced in the Pittsburgh market this week. That such a feeling could develop in spite of the unsatisfactory current demand is attributable largely to the attempts of steel producers to stabilize prices, and, in the case of bars, plates and shapes, to announce higher quotations for first quarter business. The advance of \$1 a ton on the heavy hot-rolled products for first quarter shipment was not unexpected, in view of the apparent success resulting from efforts made to stabilize quotations at 1.60c., Pittsburgh, three weeks ago.

While no other advances have been announced, and reductions continue to be made on a few products, action taken by the producers on the heavier products is thought to be the forerunner of a movement to bring steel prices again to a profitable basis. Consumers have been quick to respond to the change in trend, and inquiry has already appeared for sheets and strip which would undoubtedly have been postponed had there not been a possibility of advancing prices. Heavier contracting in tin plate and additional rail inquiry also indicate that consumers believe price declines have run their course.

Redactions on wire rods and plain wire are a recognition of weakness which has existed for some time, and conform with the policy adopted by mills in establishing a basis for stabilization which represents the actual bottom of the market. The same policy was followed a short time ago in the case of sheets and strips, in which first quarter quotations generally represented minimum selling figures.

Steel ingot operations in the Pittsburgh district are holding their own this week, although some further curtailment may be expected in the last two weeks of the month. The average for the district is slightly less than 40 per cent, with the smaller independent companies running at a considerably lower rate.

Increasing rail mill operations and a slight upturn in tin plate production are the only important changes in finishing mill output. Sheet and strip mill schedules are very low, but may hold at present levels or increase slightly as mills begin work on January requirements of the automobile companies in the latter half of this month. Pipe production also continues to ease off, but the decline from week to week is scarcely noticeable. Structural mills are still running at a fair

Steel consumers taking greater interest in first quarter needs as price stabilization proceeds.

* * *

Makers of wire products announce \$1 a ton reduction on rods and \$2 on manufacturers' wire.

* * *

Advance of \$1 a ton on bars, shapes and plates thought to be forerunner of general price strengthening movement.

* * *

Pig iron market showing more life. Ferromanganese reduced \$14 a ton.

rate, and local fabricators are booking a fair amount of tonnage.

The Inland Waterways Corp. has made formal inquiry for the 50 barges, which were authorized a short time ago, and which will require about 27,000 tons of plates. Private barge building, which has been postponed regularly for several months, also seems closer to realization.

Outstanding among developments in the raw material markets is the reduction of \$14 a ton on ferromanganese, bringing the price on small lots to \$85 a ton and on large lots to \$80. Pig iron has shown slightly more life in the last week, with several fair-sized sales reported and added inquiry for first quarter. Prices appear to be holding. The scrap market continues very dull, although prices on the principal grades seem to have steadied. Little mill buying is expected before the first of the year.

Pig Iron

One of the larger merchant sellers in this district reports considerable improvement in business since the first of the month. Shipments are exceeding production and sales have been considerably heavier than in the preceding month. Consumers are showing some interest in first quarter requirements, and, in a few cases, are asking for quotations on sufficient material to last through the second quarter. While sellers do not encourage contracting for such a long period at this time, they are willing to book tonnage for shipment during the second quarter at present prices. Foundry operations in the district show little, if any, gain, and shipments to non-integrated steel companies are very light. The recently quoted prices

are holding on the general run of business.

Prices per gross ton, f.o.b. Valley furnace:
 Basic \$17.00
 Bessemer 17.50
 Gray forge 16.50
 No. 2 foundry 17.00
 No. 3 foundry 16.50
 Malleable 17.50
 Low phos., copper free \$26.00 to 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:
 Basic \$17.50
 No. 2 foundry 17.50
 No. 3 foundry 17.00
 Malleable 18.00
 Bessemer 18.00

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel

Makers of wire rods are taking orders for first quarter at \$35, Pittsburgh, a decline of \$1 from the recent nominal quotation. Billets, slabs and sheet bars are nominally quotable at \$31, Pittsburgh or Youngstown. Occasional sales of forging billets are bringing \$36, Pittsburgh.

Ferroalloys

Sellers of ferromanganese have announced a reduction of \$14 a ton on 1931 business. This brings prices to \$85 a ton at furnace or seaboard points on small lots and to \$80 on large tonnages. With the announcement of prices, contracting for 1931 is expected to proceed.

Bars, Plates and Shapes

Independent companies in the Pittsburgh district have opened their books on the heavy hot-rolled products for the first quarter, and are generally quoting 1.65c., Pittsburgh. The advance of \$1 a ton, which was announced last week by the principal maker, was not unexpected, following the success which producers have met in stabilizing the market at 1.60c. It is too early to determine whether the higher price will hold, but the attitude of mills indicates that it will be difficult for consumers to get concessions except possibly in the case of large contracts. A few large buyers are understood to have been protected over the first quarter before the higher price went into effect and such contracts certainly will not be canceled. At any rate, it is safe to say that the small miscellaneous users will probably pay 1.65c., and a number of them are already seeking tonnage for their first quarter needs. Otherwise the market is rather dull, and current specifications are very light, particularly on bars.

The Inland Waterways Corp. has made formal inquiry for the barges

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:	Dec. 9,	Dec. 2,	Nov. 11,	Dec. 10,	Dec. 9,	Dec. 2,	Nov. 11,	Dec. 10,
	1930	1930	1930	1929		1930	1930	1929
No. 2 fdy., Philadelphia.....	\$17.76	\$17.76	\$18.76	\$21.26	Sheets, black, No. 24, P'gh...	2.35	2.35	2.35
No. 2, Valley furnace.....	17.00	17.00	17.00	18.50	Sheets, black, No. 24, Chicago			2.75
No. 2 Southern, Cin'ti.....	14.69	14.69	15.19	17.69	dist. mill.....	2.45	2.45	2.45
No. 2, Birmingham.....	14.00	14.00	14.00	14.50	Sheets, galv., No. 24, P'gh...	2.95	2.95	3.40
No. 2 foundry, Chicago*.....	17.50	17.50	17.50	20.00	Sheets, galv., No. 24, Chicago			
Basic, del'd eastern Pa.....	17.75	17.75	17.75	19.50	dist. mill.....	3.10	3.10	3.50
Basic, Valley furnace.....	17.00	17.00	17.00	18.50	Sheets, blue, No. 13, P'gh...	2.05	2.05	2.05
Valley Bessemer, del'd P'gh.....	19.26	19.26	19.26	20.76	Sheets, blue, No. 13, Chicago			2.35
Malleable, Chicago*.....	17.50	17.50	17.50	20.00	dist. mill.....	2.15	2.15	2.45
Malleable, Valley.....	17.50	17.50	17.50	19.00	Wire nails, Pittsburgh.....	1.90	1.90	1.95
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04	Wire nails, Chicago dist. mill.	1.95	1.95	2.00
Ferromanganese, furnace.....	80.00	94.00	94.00	100.00	Plain wire, Pittsburgh.....	2.20	2.30	2.40
Rails, Billets, etc., Per Gross Ton:					Plain wire, Chicago dist. mill.	2.25	2.35	2.45
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00	Barbed wire, galv., P'gh.....	2.60	2.60	3.05
Light rails at mill.....	36.00	36.00	36.00	36.00	Barbed wire, galv., Chicago			
Rerolling billets, Pittsburgh.....	31.00	31.00	31.00	35.00	dist. mill.....	2.75	2.75	3.10
Sheet bars, Pittsburgh.....	31.00	31.00	31.00	35.00	Tin plate, 100 lb. box, P'gh.....	\$5.00	\$5.00	\$5.35
Slabs, Pittsburgh.....	31.00	31.00	31.00	35.00				
Forging billets, Pittsburgh.....	36.00	36.00	36.00	40.00				
Wire rods, Pittsburgh.....	35.00	36.00	36.00	40.00				
Cents	Cents	Cents	Cents					
Skelp, grvd. steel, P'gh, lb.....	1.60	1.60	1.60	1.85				
Finished Steel,								
Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents				
Bars, Pittsburgh.....	1.60	1.60	1.60	1.90				
Bars, Chicago.....	1.70	1.70	1.70	2.00				
Bars, Cleveland.....	1.65	1.65	1.65	1.90				
Bars, New York.....	1.93	1.93	1.93	2.24				
Tank plates, Pittsburgh.....	1.60	1.60	1.60	1.90				
Tank plates, Chicago.....	1.70	1.70	1.70	2.00				
Tank plates, New York.....	1.88	1.88	1.88	2.17 1/2				
Structural shapes, Pittsburgh.....	1.60	1.60	1.60	1.90				
Structural shapes, Chicago.....	1.70	1.70	1.70	2.00				
Structural shapes, New York.....	1.85 1/2	1.85 1/2	1.85 1/2	2.09 1/2				
Cold-finished bars, Pittsburgh.....	2.00	2.00	2.00	2.30				
Hot-rolled strips, Pittsburgh.....	1.55	1.55	1.60	1.90				
Cold-rolled strips, Pittsburgh.....	2.25	2.25	2.35	2.75				

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

and tow boats authorized a short time ago, and will take bids on Dec. 12 on the tow boats and Dec. 30 on the barges. The barge inquiry calls for one to 30 units of two different types, and 50 are expected to be placed. Additional barge business is in the offing, and a Pittsburgh yard has taken four units for two Muskingum River shipper. The structural market is rather quiet, with outstanding inquiry considerably reduced. The Pennsylvania State Highway Department will take bids on Dec. 18 on two highway bridges calling for 2200 tons of steel.

Rail and Track Accessories

Railroad buying is still limited in spite of the recent publicity attending prospective expenditures by the carriers. The New York Central has issued a tentative rail inquiry. Other Eastern roads which have not yet placed their 1931 rail requirements are slow to take action. As rail business naturally precedes the placing of track accessories, little business has developed in that line. Current specifications are very light, and operations are low. The local rail mill is gradually stepping up its production.

Warehouse Business

This market is particularly dull, and small users of steel are allowing their stocks to be reduced prior to inventory taking. No price changes of importance are reported except in nails and wire products, which have declined following weakness in mill quotations.

Cold-Finished Steel Bars

Makers have not opened their books for first quarter because of price uncertainty, but announcement probably will be made during the week. Following the advance in the price of hot-rolled bars, the cold-finishing mills may try to reestablish the 2.10c. Pittsburgh, price, which has virtually disappeared in the last few weeks. Specifications are exceedingly light, and mill operations average about 30 per cent.

Tubular Goods

The pipe market is seasonally quiet. Makers of line pipe are watching developments in the oil and gas industry with considerable interest, and expect some large inquiries for pipe early in the new year. Shipments of line pipe are still going out in this

Finished Steel,	Dec. 9,	Dec. 2,	Nov. 11,	Dec. 10,	Dec. 9,	Dec. 2,	Nov. 11,	Dec. 10,
	1930	1930	1930	1929	1930	1930	1930	1929
Per Lb. to Large Buyers:								
Sheets, black, No. 24, P'gh...	2.35	2.35	2.35	2.75				
Sheets, black, No. 24, Chicago								
dist. mill.....	2.45	2.45	2.45	2.85				
Sheets, galv., No. 24, P'gh...	2.95	2.95	2.95	3.40				
Sheets, galv., No. 24, Chicago								
dist. mill.....	3.10	3.10	3.10	3.50				
Sheets, blue, No. 13, P'gh...	2.05	2.05	2.05	2.35				
Sheets, blue, No. 13, Chicago								
dist. mill.....	2.15	2.15	2.15	2.45				
Wire nails, Pittsburgh.....	1.90	1.90	1.90	2.40				
Wire nails, Chicago dist. mill.	1.95	1.95	2.00	2.45				
Plain wire, Pittsburgh.....	2.20	2.30	2.30	2.40				
Plain wire, Chicago dist. mill.	2.25	2.35	2.35	2.45				
Barbed wire, galv., P'gh...	2.60	2.60	2.60	3.05				
Barbed wire, galv., Chicago								
dist. mill.....	2.75	2.75	2.75	3.10				
Tin plate, 100 lb. box, P'gh.....	\$5.00	\$5.00	\$5.00	\$5.35				

Old Material, Per Gross Ton:

Heavy melting steel, P'gh.....	\$12.75	\$12.75	\$13.25	\$15.25
Heavy melting steel, Phila.....	11.00	11.50	11.50	14.50
Heavy melting steel, Ch'go.....	10.00	10.00	10.00	12.50
Carwheels, Chicago.....	11.75	11.75	12.50	13.50
Carwheels, Philadelphia.....	14.00	14.00	14.50	15.50
No. 1 cast, Pittsburgh.....	12.50	12.50	12.50	14.50
No. 1 cast, Philadelphia.....	12.00	12.00	12.00	15.00
No. 1 cast, Ch'go (net ton).....	9.50	9.50	9.50	13.50
No. 1 RR. wrot., Phila.....	13.50	13.50	14.00	15.50
No. 1 RR. wrot., Ch'go (net).....	8.50	8.50	8.50	12.00

Coke, Connellsville,

Per Net Ton at Oven:

Furnace coke, prompt.....	\$2.50	\$2.50	\$2.50	\$2.65
Foundry coke, prompt.....	3.50	3.50	3.50	3.75

Metals,

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Lake copper, New York.....	12.12 1/2	12.12 1/2	9.62 1/2	18.12 1/2
Electrolytic copper, refinery.....	10.75	11.25	9.25	17.75
Tin (Straits), New York.....	25.00	25.87 1/2	25.12 1/2	39.62 1/2
Zinc, East St. Louis.....	4.20	4.07 1/2	4.37 1/2	6.00
Zinc, New York.....	4.55	4.42 1/2	4.72 1/2	6.35
Lead, St. Louis.....	4.95	4.95	4.95	6.10
Lead, New York.....	5.10	5.10	5.10	6.25
Antimony (Asiatic), N. Y.....	7.10	7.10	7.10	8.62 1/2

district in fair volume, although orders booked last year have been largely completed. Standard pipe is very dull and activity in lapweld material is almost entirely lacking. Mechanical tubing is rather quiet, but there is a fair demand for boiler tubes and also for locomotive tubing. Prices continue steady.

Sheets

Higher asking prices on the heavy hot-rolled products and reports of a probable advance on sheets have brought out considerable first quarter inquiry. Small users predominate, although a few large buyers are sounding out the market. Speculative buying has appeared in a few instances, but mills are naturally discouraging such business. If prices were advanced at this time, they would not likely be effective on much first quarter business, unless those late in placing contracts were penalized. Specifications this month are at the lowest rate of the year, and mill operations do not average more than 35 per cent of capacity. Shipments to the automotive industry are small, although improvement is likely to come later in the month as car manu-

THE IRON AGE COMPOSITE PRICES

Dec. 9, 1930
One week ago
One month ago
One year ago

Finished Steel
2.121c. a Lb.
2.135c.
2.135c.
2.362c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and sheets. These products make 87 per cent of the United States output.

1930
1929
1928
1927
1926
1925

HIGH LOW
2.362c., Jan. 7; 2.121c., Dec. 9
2.412c., April 2; 2.362c., Oct. 29
2.391c., Dec. 11; 2.314c., Jan. 3
2.453c., Jan. 4; 2.293c., Oct. 25
2.453c., Jan. 5; 2.403c., May 18
2.560c., Jan. 6; 2.396c., Aug. 18

Pig Iron
\$16.02 a Gross Ton
16.02
16.29
18.29

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

HIGH LOW
\$18.21, Jan. 7; \$16.02, Dec. 2
18.71, May 14; 18.21, Dec. 17
18.59, Nov. 27; 17.04, July 24
19.71, Jan. 4; 17.54, Nov. 1
21.54, Jan. 5; 19.46, July 13
22.50, Jan. 13; 18.96, July 7

Steel Scrap
\$11.25 a Gross Ton
11.42
11.58
14.08

Based on heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

HIGH LOW
\$15.00, Feb. 18; \$11.42, Dec. 9
17.58, Jan. 29; 14.08, Dec. 3
16.50, Dec. 31; 13.08, July 2
15.25, Jan. 11; 13.08, Nov. 22
17.25, Jan. 5; 14.06, June 1
20.83, Jan. 13; 15.08, May 5

facturers prepare for their January schedules. Other consuming industries are just as quiet as the automotive. Prices are holding fairly well, with black sheets at 2.35c. to 2.45c., galvanized at 2.90c. to 3c., light plates at 1.90c. to 2c. and blue annealed sheets at 2.05c. to 2.15c. Automobile body sheets are quoted at 3.30c. and steel furniture sheets at 3.60c.

Tin Plate

The recent downward trend in production has been checked, although it is too early to ascertain whether the slight improvement in operations this week will continue. The leading interest has scheduled its mills at slightly under 50 per cent this week and a large independent company is running full this week and next in order to boost the Christmas payroll. The average rate for the industry is between 45 and 50 per cent. Contracting for 1931 is progressing somewhat better.

Wire Products

Makers of nails and wire have opened their books for first quarter, with nails at \$1.90 a keg and other merchant wire products based on this figure. Some producers are also recognizing concessions of \$2 a ton on manufacturers' wire, and are quoting a range of 2.20c. to 2.30c. on future business. While efforts are being made to hold the higher price, enough recent sales have been made at 2.20c. to force a recognition of this quotation from producers. Shading of nail prices has recently not been so prevalent, and the current \$1.90 quotation seems to be the absolute minimum on jobber business, small lots to the trade being sold at \$2. Current demand is very light, particularly for merchant wire products, although shipments of manufacturers' wire are holding rather steadily even though in reduced volume.

Strip Steel

Consumers of strip steel are showing little interest in their first quarter needs, although some of the smaller buyers have placed contracts. Current specifications are very light and cold-rolling mills are not engaged at

more than 20 per cent of capacity. Hot mills are running at 30 to 35 per cent. Prices are holding somewhat better than usual.

Coke

Following a slight improvement in demand for heating coke, the market has again quieted down and all grades are dull. An eastern Pennsylvania furnace interest has closed on its furnace coke requirements for the first half of 1931 and another is still in the market. Spot demand for furnace coke is very dull. The price is generally \$2.50, Connellsville. Shipments of foundry coke are light and prices weak.

Old Material

The scrap market continues very dull, with the only activity reported in railroad specialties and the blast furnace grades. The specialties on the Pennsylvania list brought in the

Warehouse Prices, f.o.b. Pittsburgh

	*Base per Lb.
Plates	2.85c.
Structural shapes	2.85c.
Soft steel bars and small shapes	2.75c.
Reinforcing steel bars	2.75c.
Cold finished and screw stock	
Rounds and hexagons	3.35c.
Squares and flats	3.85c.
Bands	3.10c.
Hoops	4.10c.
Black sheets (No. 24), 25 or more bundles	3.25c.
Galv. sheets (No. 24), 25 or more bundles	3.85c.
Light plates, blue annealed (No. 10), 1 to 24 plates	2.75c.
Blue annealed sheets (No. 13)	2.65c.
Galv. corrug. sheets (No. 28), per square	4.25c.
Spikes, large	2.65c.
Small	2.90c. to 3.05c.
Boat	3.15c.
Track bolts, all sizes, per 100 count, 60 and 10 per cent off list	
Machine bolts, 100 count, 60 and 10 per cent off list	
Carriage bolts, 100 count, 60 and 10 per cent off list	
Nuts, all styles, 100 count, 60 and 10 per cent off list	
Large rivets, base per 100 lb.	\$3.30
Wire, black, soft ann'd, base per 100 lb.	2.40
Wire, galv. soft, base per 100 lb.	2.85
Common wire nails, per keg	2.15
Cement coated nails, per keg	2.15

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

neighborhood of \$16.25, and dealers are offering this price rather freely to cover old orders, some of which were taken at a lower figure. However, consumers are not in the market for these grades, and the present business is made up almost entirely by buying and selling among dealers. The blast furnace grades are weaker, following a sale to one of the few consumers in the district at \$7.50. No sales of No. 1 heavy melting steel are reported, and the prospect of further mill buying before the end of the year is not good. On the other hand, dealers are making few efforts to induce mills to buy at the present low levels.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$12.50 to \$13.00
No. 2 heavy melting steel	10.50 to 11.00
Scrap rails	12.00 to 12.50
Compressed sheet steel	12.00 to 12.50
Bundled sheets, sides and ends	10.00 to 10.50
Cast iron carwheels	13.50 to 14.00
Sheet bar crops, ordinary	13.50 to 14.00
Heavy breakable cast	9.00 to 9.50
No. 2 railroad wrought	12.50 to 13.00
Hvy. steel axle turnings	10.50 to 11.00
Machine shop turnings	6.00 to 6.50

Acid Open-Hearth Grades:	
Railr. knuckles and couplers	16.00 to 16.50
Railr. coil and leaf springs	16.00 to 16.50
Rolled steel wheels	16.00 to 16.50
Low phos. billet and bloom ends	17.00 to 18.00
Low phos. mill plates	15.00 to 16.00
Low phos. light grades	15.00 to 16.00
Low phos. sheet bar crops	16.00 to 17.00
Heavy steel axle turnings	10.50 to 11.00

Electric Furnace Grades:	
Low phos. punchings	15.00 to 15.50
Heavy steel axle turnings	10.50 to 11.00

Blast Furnace Grades:	
Short shoveling steel turnings	7.00 to 7.50
Short mixed borings and turnings	7.00 to 7.50
Cast iron borings	7.00 to 7.50

Rolling Mill Grades:	
Steel car axles	18.00 to 18.50
Cupola Grades:	

No. 1 cast	12.00 to 13.00
Rails 3 ft. and under	14.00 to 14.50

Illinois Central Railroad is seeking permission from the Chicago City Council to start work on its proposed new passenger station at Roosevelt Road. Officials of the railroad state that construction must start next spring if the new terminal is to be completed in time for the 1933 World's Fair.

CHICAGO

Steel Sales and Specifications, Aided by Rail Business, Make Gain

CHICAGO, Dec. 9.—Sales of finished steel products in the week are near the peak for any similar period so far this year. However, this news must be tempered somewhat because of the fact that included in the total is some rail tonnage for which formal contracts have just been entered. The best showing was made in bars, with plates running a good second and shapes rather a poor third.

Specifications show moderate improvement, and ingot output is more firmly entrenched in the range of 40 to 45 per cent of capacity, due mainly, however, to an increase of rail production to 40 per cent.

Rail inquiries before local mills total close to 200,000 tons and others are in the making. The Missouri Pacific is reported to be progressing rapidly in its double track program between St. Louis and Kansas City. Some rail tonnage will be needed to complete the spur which will connect the Union Pacific line with the site of the Hoover dam.

The impulse of railroad shop needs is growing stronger. Western mills are receiving larger specifications from this source. Car shops, whose operations are now very low, are encouraged by the number of inquiries for repair parts as well as for car material that is to be used in several extensive rebuilding programs. It is reported that steel needed for the Great Northern shop program has been placed.

The price situation, though clarified in some directions, still shows a mixed tendency. Western producers have announced 1.75c. a lb. as the price for plates, shapes and bars for delivery after Jan. 1, and pig iron is steadily progressing into a buying movement of major size, with prices firm. On the other hand, plain wire and wire rods are quoted lower.

The scrap market is listless.

Pig Iron

Northern iron remains firm at \$17.50 a ton, local furnace, as this market swings into what is evidently a major buying movement. Fresh inquiry continues to pile up, and sales give every indication that December will be close to, if not, the best month of the year. Fully 40 per cent of first quarter contracts are already on makers' books and some very attractive tonnage has been closed for the first half. As might be expected at this time of year, shipments to melters are declining, though the rate as yet is slow, and sellers are in possession of substantial releases. The dearth of new steel business is resulting in larger quantities of steel mill iron entering the merchant market. Much of

Aided by some rail releases, steel orders and specifications come close to totals of peak weeks of 1930.

* * *

Rail production increased to 40 per cent. Ingot output at 40 to 45 per cent.

* * *

Railroad shop programs providing orders for steel for repair work.

* * *

Chicago mills announce minimum of 1.75c. on bars, shapes and plates for first quarter.

* * *

December may be one of the best months of the year in pig iron sales.

this iron is coming from sources that do not generally seek this market.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy.	sil. 1.75	\$17.50
to 2.25		
N'th'n No. 1 fdy.	sil. 2.25	18.00
to 2.75		
Malleable, not over 2.25 sil.		17.50
High phosphorus		17.50
Lake Super. charcoal sil.		
1.50		27.04
S'th'n No. 2 fdy.		17.51
Low phosphorus, sil. 1 to 2 cop.		29.20
per free		
Silver, sil. 8 per cent		26.79
Bess: ferrosilicon, 14-15 per cent		35.79

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys

Ferromanganese prices for 1931 have been announced at a reduction of \$14 a ton from recent quotations. The tonnage classifications from carlots to 500 tons and from 500 tons to 1000 tons have been revised, with \$85 a ton, seaboard, applying on lots ranging from a carload to and including 999 tons. The next 1000 tons is priced at \$82.50, and 2000 tons and upward at \$80. The price of 80 per cent electric furnace ferrosilicon remains at \$83.50, but 19 to 21 per cent spiegeleisen is quoted \$28 to \$30 a ton, Hazard, Pa. Although dealers are seeking contracts, little headway has been made so far.

Cast Iron Pipe

This week brings strong evidence of a change for the better in the cast iron pipe market. Detroit has come into the market for 11,000 tons of 24 to 36-in. pipe, and Whitefish Bay, Wis., is asking for prices on about two miles of 12 and 16-in. pipe, which will be used for a direct connection with

the water supply system at Milwaukee. Fort Wayne, Ind., is inquiring for 1000 tons of 24-in. pipe. These inquiries are outstanding for the reason that it has been many weeks since requests for prices have been bunched as they are at this time. Chicago, which originally asked for about 900 tons of 12-in. pipe, has opened bids, and now announces that its purchases will be increased to 2000 tons. The Glamorgan Pipe & Foundry Co. is low on this business at \$43.25 a ton, delivered, or \$35.25 a ton, Birmingham. Several contractors have ordered pipe this week, but of special interest is the fact that public utilities have reached the point where they are ready to take figures on pipe needed for the coming year. Inquiries indicate that their purchases for 1931 will compare favorably with the contracts made for the current year.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$44 to \$46; 4-in., \$47 to \$49; Class A and gas pipe, \$3 extra.

Sheets

As had been expected, Milwaukee hot mills closed down last week for the remainder of the year. Demand has lightened, and output by the units that are in production cannot be measured above 40 to 45 per cent of the capacity of the district as a whole. Warehouses are drawing light tonnages from mills, but container manufacturers are holding well to November schedules. Conductor pipe and eaves and gutter manufacturers are studying the market preparatory to making purchases for winter manufacturing schedules. Sales of black sheets this week disclose that this commodity is settling to a single price of 2.45c. a lb., Chicago district mill. One producer is taking a stand at 2.10c. a lb. for No. 10 blue annealed sheets.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.50c. to 2.60c.; No. 24 galv., 3.15c.; No. 10 blue annealed, 2.05c. to 2.15c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Rails and Track Supplies

The New York Central, having at first planned to issue an inquiry for 125,000 tons of rails, has come into the market for 170,000 tons, which is within a very few thousand tons of the contract placed a year ago. Distribution in the fall of 1929 brought about 50 per cent of the tonnage to Western mills. This railroad is about to take figures on 25,000 tons of splice bars. Releases against rail contracts are still expanding, the rate being faster than in recent weeks. Chicago district rail mill operations have gained 10 points and now are at

40 per cent of capacity. The Elgin, Joliet & Eastern has contracted for about one-quarter of next year's requirements and has ordered this tonnage for early shipment. Rail inquiries from the Wabash and the Kansas City Southern and old inquiries for about 5000 tons of track supplies are still before the trade.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bessemer rails, \$43; light rails, rolled from billets, \$36. *Per lb.:* Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 1.95c.; angle bars, 2.75c.

Wire Products

Demand continues to drop under seasonal influences, but output remains at 40 to 45 per cent of capacity. As expected at this time of year, production is in excess of shipments, as mills follow the established custom of using the winter season to build stocks for the spring trade.

The price situation is clarified by a reduction of \$2 a ton on plain wire to large buyers, recognizing recent concessions. First quarter books have been opened. Present nail prices have been reaffirmed. Quotations on field fencing are unchanged. Demand for copper wire remains measurably better than for steel wire. Several sizable contracts have been closed with manufacturers and the indications are that public utilities will soon be covering their copper wire needs.

Warehouse Business

Distribution of steel by local warehouses continues to taper, as is usual at this time of year. Warehouses, though still maintaining well-rounded stocks, have followed the trend of the times by holding inventories below the customary size. Prices are steady on commodities distributed in and near Chicago.

Bolts, Nuts and Rivets

With specifications growing lighter, there is little prospect that shipments in the fourth quarter will exceed 30 per cent of the total volume of contracts. First quarter commitments are being made at unchanged prices. The industry is operating between 35 and 40 per cent of capacity.

Cold-Rolled Strip

First quarter contracting is under way at quotations which are unchanged at 2.25c. to 2.35c. a lb., Cleveland. Output remains in the range of 25 to 30 per cent of capacity.

Bars

Demand for bars figures prominently in this week's sales and specifications for steel mill products. This is especially true of sales, which were in substantial volume this week from well diversified users. Forgers are taking larger quantities and are more willing to discuss future needs. Spring makers are conspicuous in this week's business. Quotations for mild steel bars are steady at 1.70c. a lb., Chicago, for delivery in December.

Most producers have announced a 1.75c. price for bars to be shipped after Jan. 1.

The alloy bar market is quiet, except that interest in future requirements is growing. Output ranges from 35 to 40 per cent of capacity.

Contrary to price trends in other bar mill products, there has been weakening to 1.55c. a lb., district mill, for rail steel bars. Although there is some evidence that interest is growing in first quarter needs, little future tonnage has been added to producers' books. One rail steel bar mill is down for extensive alterations.

Reinforcing Bars

This market offers no encouragement to bar fabricators, who have been forced to cut operations to a range of 25 to 30 per cent of capacity, which is near the low point of the year. Estimators are finding little to do. Although large inquiries have been scarce throughout the fall, small lots of reinforcing bars have been moving quite briskly. However, in the past week there has been a noticeable falling off in the number of small projects. There is still much talk of higher prices, but competition remains severely keen and quotations on small lots of bars are lower than a week ago.

Structural Material

Fresh awards total 6000 tons, which is quite an impressive figure considering the sluggishness of this market in the past month or two. New inquiries show up well at over 20,000 tons, this figure including 13,000 tons to be used for elevated structures as a part of the Chicago subway plans. A project that is receiving closer attention by the steel industry is the Hoover Dam, which will require large tonnages of steel. It is reported here that some of the plans already have been approved.

Plates

New business in line pipe and sev-

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.00c.
Soft steel bars	2.90c.
Reinforcing bars, billet steel	1.70c.
Rail steel reinforcement	1.50c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.35c.
Flats and squares	3.85c.
Bands $\frac{1}{4}$ in. (in. Nos. 10 and 12 gages)	3.10c.
Hoops (No. 14 gage and lighter)	3.65c.
Black sheets (No. 24)	3.80c.
Galv. sheets (No. 24)	4.35c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes ($\frac{1}{4}$ in. and larger)	3.55c.
Track bolts	4.00c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
Per Cent Off List	
Machine bolts	60 and 10
Carriage bolts	60 and 10
Coach or lag screws	60 and 10
Hot-pressed nuts, sq. tap. or blank	60 and 10
Hot-pressed nuts, hex. tap. or blank	60 and 10
No. 8 black ann'l'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg	\$2.30 to 2.55
Cement c't'd nails, base per keg	2.30 to 2.55

eral orders for oil storage tanks have brought this week's sales of plates to a point well above the average of November. Specifications also show improvement, as tank fabricators specify against recent orders and pipe manufacture gains. It is reported that the Santa Fe cars will be ordered this week, but there seems to be some doubt as to when the Chicago & Illinois Midland will close for its needs. Reports that the Milwaukee Road will buy cars cannot be confirmed.

Old Material

Reports have been circulated in this market that a broker was offering \$11 for No. 1 heavy melting steel. It now appears that no sales have been made at this figure. The last price paid by a mill was \$10.50 a gross ton, delivered, and consumers are not now willing to pay above this figure. Consumers at Kokomo, Ind., have cut off shipments of machine shop turnings, but will consider offers at \$6.50 a ton, delivered. The freight from Chicago to Kokomo is \$2.40, making the f.o.b. price at Chicago \$4.10 a ton.

Prices deliv'd Chicago district consumers:

Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel	\$10.00 to \$10.50
Shoveling steel	10.00 to 10.50
Frogs, switches and guards, cut apart, and misc. rails	11.25 to 11.75
Factory hyd. comp. sheets	8.50 to 9.00
Drop forge flashings	7.75 to 8.25
No. 1 busheling	7.50 to 8.00
Forg'd cast and r'l'd steel carwheels	13.50 to 14.00
Railroad tires, charg. box size	13.50 to 14.00
Railroad leaf springs cut apart	13.50 to 14.00

Acid Open-Hearth Grades:

Steel couplers and knuckles	12.00 to 12.50
Coll springs	13.50 to 14.00

Electric Furnace Grades:

Axle turnings	9.25 to 9.75
Low phos. punchings	11.50 to 12.00
and under	11.50 to 12.00

Blast Furnace Grades:

Axle turnings	5.25 to 5.75
Cast iron borings	4.00 to 4.50
Short shoveling turnings	4.25 to 4.75
Machine shop turnings	4.25 to 4.75

Rolling Mill Grades:

Iron rails	11.00 to 11.50
Rerolling rails	12.50 to 13.00

Cupola Grades:

Steel rails, less than 3 ft.	12.50 to 13.00
Steel rails, less than 2 ft.	13.00 to 13.50
Angle bars, steel	11.75 to 12.25
Cast iron carwheels	11.75 to 12.25

Malleable Grades:

Railroad	12.25 to 12.75
Agricultural	11.25 to 11.50

Miscellaneous:

*Relaying rails, 56 to 60 lb.	23.00 to 25.00
heavier	26.00 to 31.00

Per Net Ton

Rolling Mill Grades:	
Iron angle and splice bars	10.50 to 11.00

Iron arch bars, and transoms	11.00 to 11.50
Iron car axles	20.00 to 21.00

Steel car axles	13.00 to 13.50
No. 1 railroad wrought	8.50 to 9.00

No. 2 railroad wrought	8.75 to 9.25
No. 1 busheling	6.50 to 7.00

No. 2 busheling	4.50 to 5.00
Locomotive tires, smooth	12.50 to 13.00

Pipes and flues	5.50 to 6.00
Cupola Grades:	

No. 1 machinery cast	9.50 to 10.00
No. 1 railroad cast	9.00 to 9.50

No. 1 agricultural cast	8.50 to 9.00
Stove plate	7.50 to 8.00

Grate bars	7.00 to 7.50
Brake shoes	7.25 to 7.75

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

CLEVELAND

Steel Market Stimulated by Price Advance on Bars, Shapes and Plates

CLEVELAND, Dec. 9.—The market has been stimulated by the \$1 a ton price advance on steel bars, plates and shapes. Specifications against contracts, particularly for steel bars, have come out in better volume during the past week than for some time past. Some mills will accept specifications on these contracts only to Dec. 15 and others until the end of the month for shipment at mills' convenience. This assures consumers of a portion of their first quarter steel at the old prices. Mills expect that orders will be very light for shipment during the remainder of the month.

The advance appears to be well received by consumers, quite a few of whom have already closed contracts for the coming quarter at the new prices. There has also been some contracting for that delivery for sheets and hot-rolled strip. Alloy steel bars have been reestablished at 2.65c. a lb. for the coming quarter. Present prices have been reestablished on nails. However, wire rods have been reduced \$1 a ton and manufacturers' wire \$2 a ton to the large buyers. Present discounts on bolts and nuts have been reaffirmed. Sheet prices are being well maintained. Weakness is reported in some sections on hot-rolled strip, and on this material a Michigan mill has become a competitive factor in western Ohio.

With the addition of one open-hearth furnace during the week, Cleveland mills are now operating at 47 per cent of ingot capacity, or better than at any time in two months.

Actual steel requirements are expected to be light during the remainder of the month. While there has been some new demand from automobile manufacturers, this industry on the whole is slowing down. One Michigan plant, now operating on a 500 cars a day schedule, will close down this week until January, and several others will be shut down during the latter part of the month. Activity is lacking in the building field and, aside from public work in buildings and bridges, there is little work in prospect. Bids will be taken next week for approaches for the Lorain Central bridge, Cleveland, which will require 2400 tons of reinforcing bars.

Pig Iron

Sales and inquiry declined slightly the past week. Some of the inquiries previously reported in lots up to 2000 tons are still pending. Shipments so far this month are not quite up to those of November, and a further falling off is expected during the latter part of the month. With a price reduction of 50c. a ton, competition of Southern foundry iron has become more noticeable in this terri-

tory, although not many consumers appear interested in the Southern grade. No. 2 Southern is now quoted at \$11, Birmingham, or about \$1 a ton under Northern iron delivered Cleveland, and there are reports of a \$10.50 price. Lake furnace prices are unchanged at \$16 to \$17 for foundry and malleable iron for Ohio and Indiana delivery, \$17.50 furnace for Cleveland delivery and \$17.50 to \$18 in Michigan.

Prices per gross ton at Cleveland:

N'th'n fdy., sl. 1.75 to 2.25.....	\$17.50
S'th'n fdy., sl. 1.75 to 2.25.....	17.01
Malleable.....	17.50
Ohio silvery, 8 per cent.....	25.00
Stand. low phos., Valley.....	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 50c. average local switching charge; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Iron Ore

Ore on docks on Dec. 1 amounted to 6,466,326 tons, compared with 6,489,612 tons on the same date a year ago. Receipts at these docks for the season to Dec. 1 were 31,779,844 tons, against 45,747,079 tons during the same period last year, and shipments were 23,135,905 tons, against 32,907,221 tons during the same period last year. Lake front furnaces at Lake Erie ports received 7,461,958 tons, against 10,842,486 tons last year. Receipts at other American ports during the season were: Detroit, 1,103,890 tons; Indiana Harbor, 2,501,913 tons; Gary, 3,909,360 tons, and South Chicago, 6,135,411 tons. These, with small shipments to Canadian ports, amounted to 14,337,329 tons, against 18,779,099 tons during 1929.

Bolts, Nuts and Rivets

The present discount of 73 per cent off list on bolts and nuts has been reestablished for the first quarter. Stove bolt prices have also been reaffirmed. Rivet manufacturers expect to extend present prices through the coming quarter. Demand for bolts and nuts from the motor car industry has increased slightly, but demand from

Warehouse Prices, f.o.b. Cleveland

Base per Lb.

Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.85c.
Reinfor. steel bars.....	2.25c. to 2.50c.
Cold-fin. rounds and hex.....	3.40c.
Cold-fin. flats and sq.....	3.90c.
Hoops and bands, No. 12 to 4 in., Inclusive.....	3.10c.
Hoops and bands, No. 13 and lighter.....	3.65c.
Cold-finished strip.....	*5.95c.
Black sheets (No. 24).....	3.60c.
Galvanized sheets (No. 24).....	4.35c.
Blue ann'l'd sheets (No. 10).....	3.10c.
No. 9 ann'l'd wire, per 100 lb.....	\$2.35
No. 9 galv. wire, per 100 lb.....	2.80
Com. wire nails, base per keg.....	2.25

*Net base, including boxing and cutting to length.

other sources is very light. Rivets are dull.

Strip Steel

A moderate number of contracts for hot-rolled strip have been taken for the first quarter at 1.55c., Pittsburgh, for wide and 1.65c. for narrow. Current orders for small lots are bringing \$1 a ton higher. Prices seem to be well maintained, although there are reports of concessions of \$1 a ton at some points. A slight gain in orders is reported. Cold-rolled strip is still quoted at a spread of 2.25c. to 2.35c., Cleveland. Some first quarter contracts have been closed at the lower price.

Bars, Plates and Shapes

The only change in the local steel bar price situation is an advance of \$1 a ton to 1.65c., mill, by a Cleveland mill for outside shipment for the first quarter. Outside mills made this advance three weeks ago. For delivery in Cleveland, the same price is reestablished. All outside mills have advanced plates and shapes \$1 a ton to 1.65c., Pittsburgh, and a local mill has made the same advance on plates.

Semi-Finished Steel

A reduction of \$1 a ton to \$35, Cleveland, has been made on wire rods for the first quarter for larger consumers. Makers will attempt to maintain a price spread, with \$36 for small users. Prices on sheet bars, slabs and billets for the quarter have not been named. Price concessions are reported on forging billets.

Wire Products

Present nail prices of \$1.90 a keg to jobbers and \$2 to retailers have been reaffirmed for the first quarter. Recent concessions to 2.20c. on manufacturers' wire have been recognized by reducing the price to 2.20c. for the coming quarter, with a spread to 2.30c. to cover small-lot buyers.

Cold-Finished Steel Bars

While one producer has named 2.10c., Cleveland, as its first quarter price, it has not closed any contracts.

Sheets

The Fisher Body Corp. placed orders with several mills during the week for a total of 5000 to 10,000 tons of sheets, mostly auto body grades for delivery to its Cleveland plant during the remainder of December and part of January for making Chevrolet bodies. A fair tonnage is reported to have been placed by the Hudson Motor Car Co. and by the electric refrigeration industry. While bookings during the week were in-

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NEW YORK

Price Stabilization Aids Steel Demand— Pig Iron Sales 11,000 Tons

NEW YORK, Dec. 9.—Pig iron sales, at 11,000 tons, compare with 10,500 tons in the previous week and 12,000 tons two weeks ago. It is believed that 50 per cent of the buyers in this district have covered their first quarter requirements. Those who have not yet contracted for their needs are mainly the smaller melters.

The appearance of several inquiries for more distant deliveries indicates that the trade is convinced that pig iron is a good "buy" at present prices. The A. P. Smith Mfg. Co., East Orange, N. J., is in the market for 400 tons for the second quarter. Two inquiries have been put out calling for deliveries throughout 1931, the larger one covering about 1500 tons. Furnaces appear to be reluctant to commit themselves beyond the coming quarter.

Prices are still highly competitive, but are at least no weaker and in some sections of this territory seem to be somewhat firmer. An increasing number of requests for heavier shipments immediately after the first of the year or for delivery on the last day of December suggests a gain in melt in January.

Prices per gross ton, delivered New York district:
Buffalo No. 2 fdy., sil. 1.75
to 2.25 \$20.41 to \$20.91
*Buff. No. 2, del'd east.
N. J. 18.28 to 19.28
East. Pa. No. 2 fdy., sil.
1.75 to 2.25 17.39 to 18.39
East. Pa. No. 2X fdy., sil.
2.25 to 2.75 17.89 to 18.89

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

**Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.*

Ferroalloys

As of Dec. 8 the Electro Metallurgical Sales Corp., New York, announces its contract price for ferromanganese at \$85 a gross ton for all of 1931, with no differentials. The Electro Metallurgical organization also announces no change in its contract price for 50 per cent ferrosilicon for 1931 at \$83.50 a ton delivered, and in its price of ferrochromium, 4 to 6 per cent carbon, at 11c. a lb. of contained chromium. The following quotations are to rule for 1931: Ferrochromium, 2 per cent carbon, 17c. on contract, 17½c. a lb. for spot; 1 per cent carbon, 19c. a lb. on contract, 20c. a lb. for spot; 0.10 per cent carbon, 24½c. a lb. on contract, 26c. a lb. for spot; 0.06 per cent carbon, 26½c. a lb. on contract, 28c. a lb. for spot.

Cast Iron Pipe

Large public utilities are beginning to seek quotations on round tonnages of gas and water pipe for their spring requirements, preparatory to issuing formal inquiries, probably before the end of the year. The United Gas Improvement Co., Philadelphia, will

distribute 8000 tons of pipe to a number of makers, including the United States Pipe & Foundry Co., McWane Cast Iron Pipe Co. and the American Cast Iron Pipe Co. Prices are unchanged at \$35 to \$36 a net ton, f.o.b. Northern foundry, the minimum quotation usually being on tonnages of pipe for delivery during the winter months.

Prices per net ton deliv'd New York:
Water pipe, 6-in. and larger, \$37.90 to
\$38.90; 4-in. and 5-in., \$40.90 to \$41.90;
3-in., \$47.90 to \$48.90. Class A and gas
pipe, \$3 extra.

Finished Steel

Developments in the local steel market have been the most encouraging in many weeks. The price situation shows signs of further clarification preparatory to contracting for the first quarter, and such contracting has started in a small way, with indications that nearly all buyers will get under cover shortly, particularly on bars, shapes and plates, on which quotations are quite firm at 1.65c., Pittsburgh, for anything to be rolled and shipped after Jan. 1. Eastern plate and shape mills are aiming for a \$2 differential, as usual, over Pittsburgh, which would make their first quarter quotations 1.75c., f.o.b. their mills. Meanwhile, some producers are taking orders for immediate rolling at the prices prevailing before

last week's price announcements, which started with the Carnegie Steel Co. and quickly spread to the remainder of the mills. Some mills have permitted large buyers to cover for first quarter at 1.60c., but such buyers are those which usually get a price a little under the open market.

The wire situation has been clarified by a reduction on plain wire by principal makers to a range of 2.20c. to 2.30c. a lb., Pittsburgh, the lower price being minimum to large buyers. Wire rods have been reduced \$1 a ton from \$36 to \$35, Pittsburgh, nail prices have been reaffirmed at \$1.90 a 100-lb. keg to jobbers and \$2 to retailers, and some miscellaneous wire products have been adjusted slightly downward. Although this is the first formal change in the price of plain wire since the first quarter of 1930, recent concessions of \$2 a ton to large buyers in the Central district had upset the market to some extent and suggested the need for a price stabilization program.

Sheet prices are firm at recently announced levels, although there is some confusion as to galvanized sheets. A few mills are holding firmly to 3c., Pittsburgh, but other mills are quoting jobbers and large consumers 2.90c.

In the matter of bookings, orders are very light for rolling this month, but a good many of the contracts that are being made are accompanied by specifications for shipments in January. It is noteworthy that a good many buyers are not only contracting for more steel that they will have taken in the fourth quarter, but are asking for larger shipments in January than they have recently been getting. Some of the large tin plate users have signed contracts for the first half of 1931, and tin mill operations will be increased late this month or early in January. Railroad business is slow, but the inquiry of the New York Central for 170,000 tons of 105, 115 and 127-lb. steel rails, with about 25,000 tons of track accessories, is out, and bids are requested by Dec. 18. Expectations of car business are now generally deferred. It appears unlikely that there will be much inquiry before January at the earliest.

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars, small shapes	3.10c.
Iron bars	3.24c.
Iron bars, Swed. charcoal	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter hard	4.95c.
Hoops	3.75c.
Bands	3.40c.
Blue ann'd sheets (No. 10)	3.25c. to 3.40c.
Black sheets (No. 24*)	3.65c. to 3.75c.
Galvanized sheets (No. 24*)	4.25c.
Long terne sheets (No. 24)	5.80c.
Standard tool steel	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed	5.15c.
Tire steel, $\frac{1}{8}$ x $\frac{1}{8}$ in. and larger	3.40c.
Smooth finish, 1 to $2\frac{1}{2}$ in. and larger	3.75c.
Open-hearth spring steel, bases	4.50c. to 7.00c.

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

	Per Cent
Machine bolts, cut thread	Off List
$\frac{3}{8}$ x 6 in. and smaller	65
1 x 30 in. and smaller	65
Carriage bolts, cut thread	
$\frac{3}{8}$ x 6 in. and smaller	65
$\frac{3}{8}$ x 20 in. and smaller	65
Boiler Tubes	Per 100 Ft.
Lap welded, 2-in.	\$19.00
Seamless steel, 2-in.	20.25
Charcoal iron, 2-in.	26.25
Charcoal iron, 4-in.	67.00

Warehouse Business

The usual decline in buying from stock that develops prior to the holidays has set in, and business is smaller than at any time in the past few months. Prices, however, are maintained except for occasional small concessions on desirable orders. Sheet quotations are still subject to shading of \$1 to \$3 a ton.

(Concluded on page 1818)

PHILADELPHIA

Steel Prices Are Firmer—
Ferromanganese Price Reduced

PHILADELPHIA, Dec. 9.—The advance last week of \$1 a ton in quotations on plates, shapes and bars is meeting with little or no opposition from buyers and has perhaps been responsible for a fair amount of inquiry for the first quarter, though the closing of contracts is developing very slowly. Some of the larger buyers had covered for first quarter prior to the advance, but 1.65c., Pittsburgh, is being firmly adhered to on all business for delivery after Jan. 1. Small lots for rolling this month are still being taken at recent prices.

Operations of eastern Pennsylvania mills are still greatly curtailed, averaging 40 per cent or less.

The Pennsylvania Railroad is expected to issue an inquiry within a week or two for its 1931 rail requirements, estimated at about 200,000 tons. Locomotive builders are figuring on an inquiry for 10 locomotives for the St. Louis Southwestern.

Ferromanganese

Quotations on ferromanganese have been reduced to a range from \$80 to \$85 a ton at seaboard points or at furnace. The minimum price applies only to large-tonnage lots, with the maximum on lots ranging from a carload to and including 999 tons. British sellers have not yet announced prices, but are expected to meet the new domestic schedule.

Pig Iron

Except for an occasional small order for first quarter delivery, foundry iron demand is quiet. Prices continue to range from \$17 to \$17.50 a ton, eastern Pennsylvania furnace. Recent reductions in stocks of iron at Southern furnaces have brought a firmer tone to the Birmingham quotation, which is \$11 a ton, furnace, for ordinary tonnages, with a possible concession of 50c. a ton on a sizable contract. By the end of the month, two leading pig iron producers in the South are expected to have only one furnace each in blast. The Virginia furnace probably will be blown out by the end of the month. The Boston Navy Yard will open bids Dec. 19 on 200 tons of foundry iron.

Prices per gross ton at Philadelphia:
East. Pa. No. 2, 1.75 to 2.25 sil. \$17.76 to \$18.76
East. Pa. No. 2X, 2.25 to 2.75 sil. 18.26 to 19.26
East. Pa. No. 1X..... 18.76 to 19.76
Basic (del'd east. Pa.).... 17.75 to 18.25
Malleable..... 20.00 to 21.00
Stand. low phos. (f.o.b. east. Pa. furnace).... 23.00 to 24.00
Cop. b'r'g low phos. (f.o.b. furnace).... 22.00 to 23.00
Va. No. 2 plain, 1.75 to 2.25 sil. 22.29
Va. No. 2X, 2.25 to 2.75 sil. 22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Steel Bars

Small lots are quoted at 1.65c. a lb., Pittsburgh, or 1.94c., delivered Philadelphia. Contracting for first quarter has not yet developed. Reinforcing bar prices are unchanged at 1.65c. to 1.70c., Pittsburgh, or 1.94c. to 1.99c., delivered Philadelphia, for billet steel bars. Rail steel bars range from 1.50c. to 1.55c., Franklin, Pa., or 1.79c. to 1.84c., Philadelphia.

Shapes

Quotations on current business range from 1.70c. to 1.75c., f.o.b. nearest mill to consumer, or 1.76c. to 1.81c., Philadelphia, depending upon the specifications offered. The minimum quotation for sizable lots to be delivered in the first quarter is 1.70c., mill, or 1.76c., Philadelphia, which is \$2 or more a ton higher than the larger fabricators have been paying in the present quarter.

Plates

Mills are quoting 1.75c. a lb., Coatesville, Pa., or 1.85½c., Philadelphia, on current small orders, with 1.70c., Coatesville, or 1.80½c., Philadelphia, quoted on larger lots, and for first quarter commitments. Inquiry for plate tonnages has shown some improvement in the past week.

Sheets

Buying is limited to occasional small lots for immediate use. Prices are being maintained, with black sheets at 2.35c. a lb., Pittsburgh, or 2.64c., Philadelphia, and galvanized at 3c., Pittsburgh, or 3.29c., Philadelphia. Distributors and large users of galvanized sheets usually receive a concession of \$2 a ton to 2.90c., Pittsburgh, or 3.19c., Philadelphia. Blue annealed sheets, No. 13 gage, are 2.05c., Pittsburgh, or 2.34c., Philadelphia, and blue annealed plates, No. 10 gage, are 1.90c. to 2c., Pittsburgh, or 2.19c. to 2.29c., Philadelphia.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, ¼-in. and heavier.....	2.50c.
Structural shapes.....	2.50c.
Soft steel bars, small shapes, iron bars (except bands).....	2.60c.
Reinforce. steel bars, sq. twisted and deform.....	2.50c. to 2.60c.
Cold-fin. steel, rounds and hex.....	3.40c.
Cold-fin. steel, sq. and flats.....	3.90c.
Steel hoops.....	3.15c.
Steel bands, No. 12 to 4-in. inclu.....	2.90c.
Spring steel.....	5.00c.
*Black sheets (No. 24).....	3.60c.
†Galvanized sheets (No. 24).....	4.15c.
Light plates, blue annealed (No. 10).....	3.05c.
Blue ann'd sheets (No. 13).....	3.20c.
Diam. pat. floor plates, ¼-in.....	5.20c.
Swedish iron bars.....	6.60c.

*For 50 bundles or more; 10 to 40 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.

†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

Imports

In the week ended Dec. 6, 4238 tons of chrome ore arrived at this port, of which 3518 tons was from Cuba and 720 tons from Greece. Steel imports consisted of 180 tons of steel bars, of which 107 tons came from France, 60 tons from Belgium and 13 tons from Germany; 1012 tons of steel blooms from France, and a total of 147 tons of structural shapes, of which 116 tons came from France and 31 tons from Germany; also 186 tons of steel bands from France.

Old Material

While dealers are unwilling to commit themselves on contracts for No. 1 heavy melting steel at less than \$11.50 a ton, delivered to eastern Pennsylvania mills, small stocks in yards are available at \$11 a ton, delivered. A consumer at Bethlehem, Pa., which bought a small lot recently at \$11 a ton, was awarded a small tonnage of No. 1 steel on a railroad list of scrap on a bid of \$10.25 a ton. Other grades of scrap are inactive and prices lack firmness.

<i>Prices per gross ton delivered consumers' yards, Philadelphia district:</i>		
No. 1 heavy melting steel..	\$11.00 to	\$11.50
No. 2 heavy melting steel..	9.50 to	10.00
Heavy melting steel (yard)	9.00 to	9.50
No. 1 railroad wrought..	13.00 to	14.00
Bundled sheets (for steel works)	9.00	
Hydraulic compressed, new	10.00 to	10.50
Hydraulic compressed, old	9.00 to	9.50
Machine shop turnings (for steel works)	6.50 to	7.50
Heavy axle turnings (or equiv.)	10.50 to	11.00
Cast borings (for steel works and roll. mill)	7.50 to	8.00
Heavy breakable cast (for steel works)	11.00 to	11.50
Railroad grate bars.....	9.00	
Stove plate (for steel works)	9.00	
No. 1 low phos. hvy. 0.04% and under.....	19.00 to	20.00
Couplers and knuckles.....	16.50 to	17.50
Rolled steel wheels.....	15.50 to	16.00
No. 1 blast f'nace scrap..	6.50 to	7.00
Wrot iron and soft steel pipes and tubes (new specific)	11.50 to	12.00
Shafting	18.00	
Steel axles	20.50 to	21.00
No. 1 forge fire	11.00	
Cast iron carwheels.....	14.00 to	14.50
No. 1 cast	12.00 to	12.50
Cast borings (for chem. plant)	14.00 to	14.50
Steel rails for rolling.....	13.50 to	14.00

Midland Steel Products Co., at its experimental laboratory at the Cleveland plant, has developed a number of new products and processes during the past year, including certain pressed steel parts for electric washing machines. The company has received substantial orders for this material from washing machine manufacturers, according to E. J. Kulas, president.

BOSTON

Cast Iron Pipe More Active—Pig Iron Sales 3500 Tons

BOSTON, Dec. 9.—Pig iron sales the past week totaled not more than 3500 tons, of which the Mystic Iron Works took a large proportion. That stack's sales included iron for New Jersey delivery and a 1000-ton lot to a Connecticut melter. There is only one sizable inquiry in the market, for 1400 tons from a southern New England melter for second, third and fourth quarter delivery. The buyer may split his purchase equally between two furnaces. The Government will close bids Dec. 19 on a comparatively small tonnage for the Boston Navy Yard. Buffalo, east of Buffalo, and Alabama furnaces are competing actively for business in this territory.

Freight rates: \$4.91 all rail from Buffalo; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

†Rail and water rate.

P. S. S. S. S.

Reinforcing Steel

Sales for the week were under 500 tons, and included 165 tons for a bath-house, 125 tons for a local professional arts building, and about 200 tons in small lots. Bids will be opened Dec. 19 on 500 tons for a Coast Guard station at New London, Conn. Despite the announcement of an advance on bars, shapes and plates by steel mills for first quarter delivery, local prices on billet steel bars are weaker than heretofore so far as current orders are concerned. From stock, such bars the past week were sold at 2.90c.

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.36 $\frac{1}{2}$ c.
Structural shapes—	
Angles and beams	3.36 $\frac{1}{2}$ c.
Tees	3.36 $\frac{1}{2}$ c.
Zees	3.36 $\frac{1}{2}$ c.
Soft steel bars, small shapes	3.26 $\frac{1}{2}$ c.
Reinforcing bars	3.11 $\frac{1}{2}$ c. to 3.26 $\frac{1}{2}$ c.
Iron bars—	
Refined	3.26 $\frac{1}{2}$ c.
Best refined	4.60 c.
Norway rounds	6.60 c.
Norway squares and flats	7.10 c.
Spring steel—	
Open-hearth	5.00 c. to 10.00 c.
Crucible	12.00 c.
Tire steel	4.50 c. to 4.75 c.
Bands	4.015 c. to 5.00 c.
Hoop steel	5.50 c. to 6.00 c.
Cold-rolled steel—	
Rounds and hex	3.50 c. to 5.50 c.
Squares and flats	4.00 c. to 6.00 c.
Toe calk steel	6.00 c.
Rivets, structural or boiler	4.80 c.
	Per Cent Off List
Machine bolts	60 and 5
Carriage bolts	60 and 5
Lag screws	60 and 5
Hot-pressed nuts	60 and 5
Cold-punched nuts	60 and 5
Stove bolts	70 and 10

1 lb., base, in 1 to 5-ton lots, although in isolated cases 3c. was obtained; 6 to 99-ton lots at 2.50c., and 100-ton lots and larger at 2.15c. It is reported that on 6 to 99-ton lots 2.45c. a lb., base, was done and on 100-ton lots and larger bids of 2.10c. were made. At Boston rate points, rail steel bars are 2.26½c. a lb., but elsewhere there is no established market.

Cast Iron Pipe

The outstanding feature in this district the past week was the activity of cast iron pipe. Boston closed bids on 200 tons of 6-in. Class B pipe, 500 tons of 8-in., 200 tons of 10-in., 1000 tons of 12-in., 250 tons of 16-in., and 30 tons of 24 to 48-in. special castings; also on 1350 tons of 8, 12, 16 and 20-in. high-pressure pipe and 170 tons of special castings, a total of 3500 tons of pipe and 200 tons of castings. The Warren Foundry & Pipe Co.'s bids of \$40.50 a ton, delivered, on Class B and of \$43.15 on high-pressure pipe were low. That foundry's bid of \$110 a ton on the Class B special castings also was low. Hanson, Mass., closed bids on approximately 455 tons of 6-in. pipe, 800 tons of 8-in. and an indefinite amount of 10-in. R. D. Wood & Co. were the low bidders at 56c. a ft. on the 6-in., 81c. on the 8-in. and \$1.08 on the 10-in. Nashua, N. H., placed 2000 ft. of 6-in., 2200 ft. of 8-in., 3000 ft. of 10-in. and 2200 ft. of 12-in., approximately 300 tons, with the Donaldson Iron Co. Norwood, Mass., instead of buying 175 tons of Class C pipe as specified in its inquiry and on which the Donaldson Iron Co. was the low bidder, took McWane pipe. The Lowell Gas Light

Co., Lowell, Mass., is out with the announcement that it will purchase \$225,000, of gas pipe early next year, and East Bridgewater, Mass., will buy a small tonnage of Class B pipe.

Old Material

The market is still in the doldrums. Brokers have virtually no orders to fill, prices for scrap on which there is a thin market are too low to be attractive to sellers, while metal-working plant activities have not expanded sufficiently to permit any noticeable accumulation of scrap. Brokers see little likelihood of a change in the market until after Jan. 1. No demand exists for steel turnings, steel mill borings, mixed borings and turnings, shafting, axles, rails for rerolling, pipe and railroad wrought, consequently prices quoted by the trade are guesswork. Not enough No. 1 heavy melting steel was moved the past week to establish a market price.

*Buying prices per gross ton, f.o.b. Boston
rate shipping points:*

Rate shipping points.	
No. 1 heavy melting steel.	\$6.50 to \$7.00
Scrap T rails	6.50 to 7.00
Scrap girder rails	5.50 to 6.00
No. 1 railroad wrought...	7.50 to 7.60
Machine shop turnings...	2.00 to 2.50
Cast iron borings (steel works and rolling mill)	2.00 to 2.50
Bundled skeleton, long...	6.00 to 6.50
Forge flashings.....	6.00 to 6.50
Blast furnace borings and turnings	2.00 to 2.10
Forge scrap	5.50 to 6.00
Shafting	12.50 to 13.50
Steel car axles	14.00 to 15.00
Wrought pipe, 1 in. in di- ameter (over 2 ft. long)	6.00 to 6.50
Rails for rolling.....	8.50 to 9.00
Cast iron borings, chemical	9.00 to 9.50
<i>Prices per gross ton deliv'd consumers' yards:</i>	
Textile cast	\$11.00 to \$11.50
No. 1 machinery cast.....	11.50 to 12.50
No. 2 machinery cast.....	9.50 to 10.50
Stove plate	8.00 to 8.50
Railroad malleable	13.00 to 13.50

BIRMINGHAM

Pig Iron Buyers in South Marking Time—Steel Demand Gains Slightly

BIRMINGHAM, Dec. 9.—Sales of pig iron in this district receded even further last week. Buyers are said to be staying out of the market more than usual on account of cutting stocks to the very minimum for the approaching inventory period and because of general tendency to await the announcement of first quarter prices before committing themselves on any advance tonnage. Very few negotiations are reported on first quarter iron, and when the books are opened for that period a moderate buying movement is the most that is indicated or expected. Shipments for the first week of December showed a slight increase over those of last week of November, but they are still below production in most cases. Prices are unchanged for district delivery during December.

The No. 3 North Birmingham furnace of the Sloss-Sheffield Steel & Iron Co., which had been operating on foundry iron, was blown out on Dec.

4. On Dec. 5 the Tennessee company blew in its Ensley No. 4 furnace on foundry iron to replace its Ensley furnace No. 5, which was banked on the same date. This leaves nine active blast furnaces in the district. Of this number, eight are on foundry iron and one on basic iron.

*Prices per gross ton, f.o.b. Birmingham
dist. furnaces:*

Finished Steel

Current business for the first week of December was up to the November average and showed a slight increase over the week preceding. Rails and railroad accessories are the only two important lines that are without some sort of a market. In most instances mills are operating on current orders, and the rolling schedules undergo frequent changes to take care of the numerous small specifications. Consumers' stocks are reported as gener-

ally light. There have been no changes in price quotations here, though the market is said to be a little firmer following announcement of advances in other sections. Bars, plates and shapes have been quoted at 1.75c. to 1.80c. for the past four weeks. Sheet prices are without change since the \$1 reduction announced a week ago.

The past 10 days have been considered the dullest period of the year in the structural steel market from the standpoint of new business added to books. No large orders are reported and small orders have declined in volume. The reinforcing bar market shows no improvement from its very weak condition.

Active open-hearths in the district total eight of 23, the same as for the past three weeks.

Cast Iron Pipe

Pressure pipe tonnage up for figures at present is said to be about as large as at any time in recent weeks. District plants are bidding on 11,000 tons of 24, 30 and 36-in. pipe to be awarded this week by Detroit. Lawton, Okla., is to open bids Dec. 16 on 12,000 ft. of 24-in. pipe, and Clarkton, Mo., will open bids on the same date for 10,000 ft. of 4-in. pipe and 2100 ft. of 6-in. pipe. Dec. 16 is also the date for opening of bids on 1.6 miles of 6 and 8-in. pipe for Spartanburg, S. C. Dec. 20 is the tentative date set by Dallas, Tex., for bids on 75,000 ft. of 8-in. pipe and 8000 ft. of 12-in. pipe. The United States Pipe & Foundry Co. has booked an order at New Orleans calling for 4800 ft. of 24-in. pipe, 4150 ft. of 30-in. pipe and 4400 ft. of 48-in. pipe. The National Cast Iron Pipe Co. has received contract for about 250 tons for Port Arthur, Tex. Plants here shared in the 3336-ton order recently placed by Los Angeles, Cal. The larger orders last week are reported to have been placed under the quoted prices of \$37 to \$38, base Birmingham. Concessions are reported on all orders of any importance for large diameter pipe.

Old Material

Shipments show a further tapering. The approaching inventory and holiday periods are held responsible for the fact that the market is almost at a standstill. Quotations are unchanged.

Prices per gross ton deliv'd Birmingham dist. consumers' yards:	
Heavy melting steel.....	\$10.00
Scrap steel rails.....	10.50
Short shoveling turnings.....	9.00
Cast iron borings.....	9.00
Stove plate.....	9.00
Steel axles.....	19.00
Iron axles.....	18.00
No. 1 railroad wrought.....	10.00
Rails for rolling.....	11.50 to 12.00
No. 1 cast.....	11.00 to 11.25
Tramcar wheels.....	11.00 to 11.25
Cast iron borings, chem.....	13.50
Cast iron carwheels.....	11.00

General Cable Corp., New York, has announced a varied line of insulated aluminum wires and cables under the trade name "Aelectral."

CINCINNATI

Differentials on Foundry Pig Iron Frequently Waived

Warehouse Prices, f.o.b. Cincinnati

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
New billet reinforce. bars.....	3.15c.
Rail steel reinforce. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.35c.
Cold-fin. rounds and hex.....	3.80c.
Squares.....	4.30c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'd sheets (No. 10).....	3.45c.
Structural rivets.....	4.20c.
Small rivets.....	60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more).....	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.....	10.25
	Net per 100 Ft.
Lap-welded steel boiler tubes, 2-in.	\$16.50
4-in.	34.50
Seamless steel boiler tubes, 2-in.	17.50
4-in.	36.00

inquiring at a good rate and indicate a desire to cover at present prices in the near future.

Old Material

With virtually no demand for scrap, dealers have reduced bids on all items from 50c. to \$1. The scrap that is being purchased is piled in yards, since mills have not lifted their suspensions on shipments. New business is negligible.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$10.00 to \$10.50
Scrap rails for melting.....	10.50 to 11.00
Loose sheet clippings.....	5.50 to 6.00
Bundled sheets.....	8.75 to 9.25
Cast iron borings.....	4.00 to 4.50
Machine shop turnings.....	5.00 to 5.50
No. 1 busheling.....	8.00 to 8.50
No. 2 busheling.....	4.50 to 5.00
Rails for rolling.....	11.50 to 12.00
No. 1 locomotive tires.....	11.00 to 11.50
No. 2 railroad wrought.....	9.50 to 10.00
Short rails.....	14.75 to 15.25
Cast iron carwheels.....	10.50 to 11.00
No. 1 machinery cast.....	14.00 to 14.50
No. 1 railroad cast.....	12.00 to 12.50
Burnt cast.....	6.50 to 7.00
Stove plate.....	6.50 to 7.00
Brake shoes.....	6.50 to 7.00
Agricultural malleable.....	12.00 to 12.50
Railroad malleable.....	13.00 to 13.50

YOUNGSTOWN

Valley Steel Mills Advance Prices \$1 a Ton on Plates and Bars

quoted schedules on forward contracts.

Buying for the early part of next year is not proceeding very rapidly, and in many cases purchases will likely be delayed until after inventory taking the last of this month. While analysis of stocks by consumers will likely bring many of them into the market in a small way, present inventories are not abnormally low when considered in the light of the very low rate of current demand. Under the circumstances Valley steel makers will not be surprised if January brings only a moderate upturn in orders, with more substantial improvement coming in the spring.

Steel company operations in this district are still tending downward, but curtailment this month can be largely attributed to seasonal influences. December is nearly always a low month from a production standpoint, and the minimum production schedules now being reached are not unexpected. Open-hearth production in the Youngstown district is scarcely at more than 25 per cent of capacity, and the last two weeks of the year may see activity in local steel-making departments practically at a standstill. Only a few blast furnaces are active, and stacks recently relined may not go in blast until after the first of the year. Finishing mill schedules are unsteady and vary from a complete suspension one week to a 40 to 50 per cent rate in the following. If it were not for the electric-weld pipe units in the district, the general rate of rolling mill activity would not be much higher than that in steel-making departments. With almost certain promise of some improvement next month, the current depressed state of the industry is not of as serious concern as it might be, and sentiment in the district is considerably better than it was during November. Some mills even hope to see a limited improvement in shipments this month as compared with the previous 30 days, although such business cannot be expected until the latter half of the month.

The automobile industry offers the most definite promise of increasing its steel requirements next month, and some Valley mills are already quoting on steel for considerably increased schedules. Capacity in this district is not of the type to benefit very much from business from the railroads, although a large car building program would bring out considerable tonnage in bars, sheets and plates. Probable pipe purchases by the oil and gas companies are being studied rather carefully, and local mills are relying rather heavily on this business for 1931. Valley fabricators of steel building products are watching their outlets closely and keeping their steel purchases at a minimum.

The market on raw materials is very dull, although minimum prices seem to have been reached. Small sales of pig iron in the immediate territory are being made on the basis of \$17, Valley furnace, for foundry iron, and \$17.50 for malleable and Bessemer. No recent sales of basic iron have been reported. Mold foundries in the district are running in a limited way, which might be expected with the low rate of steel ingot operations. No recent scrap sales have been made to test the market, while dealer offerings of heavy melting steel are generally at around \$13. Distress tonnage might occasionally be bought for slightly less. Shipments to a number of principal scrap consuming points in northern Ohio have been suspended for the remainder of the year, as steel company stocks are more than ample.

CANADA

Dominion Consumers Showing Little Interest in Forward Requirements

TORONTO, Dec. 9.—Notwithstanding that there are indications of early improvement in the Canadian iron and steel industry, manufacturing interests are showing little interest in raw material needs other than for immediate requirements. The demand for merchant pig iron, while slightly better than a week ago, is still running in small tonnage lots. Melters are confining purchases to spot needs and no contracts have been closed for the first quarter. Pig iron prices are unchanged.

The Algoma Steel Corp., Sault Ste. Marie, Ont., will shut down its rail mill until after the turn of the year. During the shutdown the installation of new machinery will be resumed, and is expected to be completed in time to run on the new rail business that may develop within the next few weeks.

Prices per gross ton:

	Delivered Toronto	Delivered Montreal
No. 1 fdy., sil. 2.25 to 2.75...	\$22.60	
No. 2 fdy., sil. 1.75 to 2.25...	22.10	
Malleable	22.60	
		Per Net Ton
No. 1 fdy., sil. 2.25 to 2.75...	\$24.00	No. 1 mach'ry cast.....
No. 2 fdy., sil. 1.75 to 2.25...	23.50	Stove plate
Malleable	24.00	Standard carwheels.....
Basic	20.50	Malleable scrap.....

Structural Steel

Structural steel sales are again showing improvement, and several large jobs are in prospect for early closing. While awards during the week were of 500 tons or less, business pending includes contracts ranging from 300 to as high as 3000 tons. Bridge construction is still responsible for the bulk of new business.

Old Material

There has been no change in market conditions during the week. Sales are confined to small tonnage lots for immediate needs of consumers. Prices are unchanged.

Dealers' buying prices for old material:

	Per Gross Ton	Per Net Ton
Heavy melting steel.....	\$7.00	\$6.00
Rails, scrap.....	7.00	6.00
No. 1 wrought.....	6.00	8.00
Machine shop turnings.....	2.00	2.00
Boiler plate	5.00	4.50
Heavy axle turnings.....	2.50	2.50
Cast borings	2.00	2.00
Steel borings	2.00	2.00
Wrought pipe	2.00	2.00
Steel axles	7.00	9.00
Axes, wrought iron.....	7.00	11.00
No. 1 machinery cast.....		10.00
Stove plate		8.00
Standard carwheels.....		8.50
Malleable		8.00
		Per Net Ton
No. 1 mach'ry cast.....	11.00	...
Stove plate	9.00	...
Standard carwheels.....	10.00	...
Malleable scrap.....	9.00	...

ST. LOUIS

Southern Iron Sold at \$10.50, Birmingham—Steel Prices Firmer

ST. LOUIS, Dec. 9.—Some Southern pig iron was sold during the last week on the basis of the new price of \$10.50, f.o.b. Birmingham, but there was no heavy buying such as might be expected at the present price, which is the lowest since 1913. It is stated that only three times since 1909 has pig iron been at this low level. The impression is that low prices in themselves will not stimulate buying so long as melters are in their present conservative mood. The St. Louis Gas & Coke Corp. is maintaining its price of \$17.50, f.o.b. Granite City. Its shipments for November were reported to be heavy, but the movement was more of specifications against contracts than new business. Users of basic iron in this district are expected to come into the market shortly for their first quarter needs.

Prices per gross ton at St. Louis:

No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill...	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n. No. 2 fdy., deliv'd St. Louis	19.66
Southern No. 2 fdy., deliv'd \$14.92 to 15.92	
Northern malleable, deliv'd 19.66	
Northern basic, deliv'd 19.66	

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Finished Steel

The usual pre-inventory lull prevails in the finished steel trade. There are some inquiries, and a small vol-

ume of orders for first quarter shipments of plates, shapes and bars, with prices firm. Warehouse business during November was about on a par with that of October, but business probably will be dull, as usual, between now and Christmas. Factors here say that there is a better feeling in the trade, and an improvement is expected after the turn of the year. Fabricators of structural steel and rollers of reinforcing bars report light business and no large jobs in prospect,

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin. rounds, shafting, screw stock	3.60c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	4.60c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.10c.
Galv. corrug. sheets	4.70c.
Structural rivets.....	4.15c.
Boiler rivets	4.15c.
	Per Cent Off List
Tank rivets, $\frac{1}{4}$ -in. and smaller, 100 lb. or more	65
Less than 100 lb.	60
Machine bolts	60
Carriage bolts	60
Lag screws	60
Hot-pressed nuts, sq. blank or tapped, 200 lb. or more	60
Less than 200 lb.	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more	60
Less than 200 lb.	50

except the Merchandise Mart, requiring 3325 tons of reinforcing bars.

Old Material

Scrap dealers and consumers are merely marking time. No buying of consequence is expected until either immediately before or after Jan. 1.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel	\$10.25 to \$10.75
No. 1 heavy melting or shoveling steel	9.75 to 10.25
No. 2 heavy melting or shoveling steel	9.00 to 9.50
No. 1 locomotive tires	11.00 to 11.50
Misc. stand.-sec. rails including frogs, switches and guards, cut apart	10.25 to 10.75
Railroad springs	13.00 to 13.50
Bundled sheets	6.50 to 7.00
No. 2 railroad wrought	9.75 to 10.25
No. 1 busheling	7.00 to 7.50
Cast iron borings and shoveling turnings	6.00 to 6.50
Iron rails	9.50 to 10.00
Rails for rolling	11.50 to 12.00
Machine shop turnings	3.50 to 4.00
Heavy turnings	8.00 to 8.50
Steel car axles	14.00 to 15.00
Iron car axles	20.50 to 21.00
Wrot. iron bars and trans.	12.50 to 13.00
No. 1 railroad wrought	7.50 to 8.00
Steel rails, less than 3 ft.	13.00 to 13.50
Steel angle bars	10.00 to 10.50
Cast iron carwheels	11.00 to 11.50
No. 1 machinery cast	10.50 to 11.00
Railroad malleable	10.00 to 10.50
No. 1 railroad cast	10.00 to 10.50
Stove plate	8.50 to 9.00
Relay. rails, 60 lb. and under	16.00 to 16.50
Relay. rails, 70 lb. and over	20.00 to 21.00
Agricult. malleable	10.00 to 10.50

Pacific Coast

Some Prospective Business Postponed Until the New Year

SAN FRANCISCO, Dec. 6.—(By Air Mail.)—Demand for iron and steel products has tapered during the past week, and important buying is not now looked for until after the first of the year. While awards were not numerous, several fair-sized projects were placed. Outstanding were 3200 tons of structural shapes for the Burrard Street bridge, Vancouver, B. C., awarded to the Dominion Bridge Co.

Bars

Only two projects requiring over 100 tons of reinforcing bars were reported. An unnamed interest secured 2000 tons for the Burrard Street bridge, Vancouver, B. C., and 300 tons for an apartment building on Franklin Street, Los Angeles. Inquiries were confined to lots ranging from 40 to 80 tons. Quotations on out-of-stock material remain unchanged in both the Los Angeles and San Francisco districts at 2.50c., base, on carload lots. While movement of merchant bar steel continues light, prices ap-

pear to be firm, with 2.25c., c.i.f., now general.

Plates

Awards of plates were confined to small lots. Los Angeles has opened bids on upward of 3000 tons for a 38 and 51-in. welded steel pipe line. Phoenix, Ariz., has awarded a pipe line project to Schmidt & Hitchcock on the basis of concrete pipe, although it is reported that a portion of the line will be welded steel. No change in prices is noted, 2.05c., c.i.f., being the usual quotation.

Shapes

Structural shape awards totaled more than 5500 tons. The Moore Dry Dock Co. secured 950 tons for the Paramount Theater in Oakland, the Virginia Bridge & Iron Co. booked 521 tons for the First Street bridge, San Diego, and the Kansas City Structural Steel Co. took 900 tons for an office building in Phoenix, Ariz. Bids have been opened on 110 tons for a bridge over Richardson Bay in Marin County, Cal.

BUFFALO

Steel Mill Operation the Lowest in Many Years

BUFFALO, Dec. 9.—The Wickwire Spencer blast furnace has gone out, but whether the reduction in district pig iron production will strengthen the market remains to be seen. During the past week prices on New England business were shaded. Sales totaled at least 4000 tons, and possibly as much as 5000 tons. The largest reported order was 1000 tons for the Fairbanks Co., with plant at Binghamton, N. Y. A radiator company is reported to be in the market for 1000 tons.

Prices per gross ton, f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25	\$17.50
No. 2X fdy., sil. 2.25 to 2.75	18.00
No. 1 fdy., sil. 2.75 to 3.25	19.00
Malleable, sil. up to 2.25	18.00
Basic	17.50
Lake Superior charcoal	27.28

Finished Steel

Mill operation in this district has reached the lowest level in many years. The Lackawanna plant of the Bethlehem Steel Co. is operating four open-hearths and the Donner plant of the Republic Steel Corp. is down to two. The Wickwire Spencer plant continues with two and Gould Coupler is operating one. A school contract has been placed requiring 250 tons of reinforcing bars.

Warehouse Prices, f.o.b. Buffalo

	Base per Lb.
Plates and struc. shapes	3.25c.
Soft steel bars	3.15c.
Reinforcing bars	2.95c.
Cold-fin. flats and sq.	3.65c.
Rounds and hex.	3.15c.
Cold-rolled strip steel	5.85c.
Black sheets (No. 24)	4.20c.
Galv. sheets (No. 24)	4.60c.
Bands	3.50c.
Hoops	2.90c.
Blue ann'l'd sheets (No. 10)	3.50c.
Com. wire nails, base per keg	\$2.60
Black wire, base per 100 lb.	3.20

Pig iron prices per gross ton at San Francisco:

*Utah basic	\$22.00 to \$24.00
*Utah fdy., sil. 2.75 to 3.25	22.00 to 24.00
**Indian fdy., sil. 2.75 to 3.25	22.00 to 24.00

*Delivered San Francisco.

**Duty paid, f.o.b. cars San Francisco.

Warehouse Prices, f.o.b. San Francisco

Base per Lb.

Plates and struc. shapes	3.40c.
Soft steel bars	3.40c.
Black sheets (No. 24)	4.35c.
Blue ann'l'd sheets (No. 10)	3.80c.
Galv. sheets (No. 24)	5.00c.
Struc. rivets, 3/4-in. and larger	5.00c.
Com. wire nails, base per keg	\$3.35
Cement c't'd nails, 100 lb. keg	3.35

Cast Iron Pipe

While several important tonnages are pending, awards were confined to two projects. The American Cast Iron Pipe Co. secured 150 tons of 8 to 12-in. Class 150 pipe for the Weyerhaeuser Timber Co., Longview, Wash., and 100 tons of 8 and 12-in. Class 150 pipe for Seattle. Bids have been opened on 926 tons of 6 and 8-in. Class 150 pipe for San Francisco. Newport Beach, Cal., will open bids Jan. 5 on 100 tons of 2 to 8-in. Class 150 pipe. Phoenix, Ariz., will award 1100 tons of 6 to 12-in. Class B pipe within the next few days.

Old Material

The market here has been thrown into confusion by the action of the largest consumer in embarking shipments of all grades of scrap. As other principal consumers had suspended shipments some weeks ago, this deprives Buffalo dealers of an outlet for their material, and a difficult situation is being created by the rejection of cars en route, which are necessarily becoming "distress" cars. The embargo has had the effect of softening the market for all grades.

Prices per gross ton, f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$10.50 to \$11.00
No. 2 heavy melting scrap	9.00 to 9.50
Scrap rails	11.00
Hydraul. comp. sheets	9.00 to 9.50
Hand bundled sheets	8.00 to 8.50
Drop forge flashings	9.00 to 9.50
No. 1 busheling	9.00 to 9.50
Hvy. steel axle turnings	11.00 to 11.50
Machine shop turnings	5.50 to 6.00
No. 1 railroad wrought	10.00 to 10.50

Acid Open-Hearth Grades:

Knuckles and couplers	13.00 to 13.50
Coil and leaf springs	13.00 to 13.50
Rolled steel wheels	13.00 to 13.50
Low phos. billet and bloom ends	15.00 to 15.50

Electric Furnace Grades:

Short shov. steel turnings	8.50 to 9.00
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Blast Furnace Grades:

Short mixed borings and turnings	7.00 to 7.50
Cast iron borings	7.00 to 7.50

Rolling Mill Grades:

Steel car axles	15.00 to 15.50
Iron axles	16.00 to 16.50

Cupola Grades:

No. 1 machinery cast	10.25 to 11.00
Stove plate	9.50 to 10.00
Locomotive grate bars	8.25 to 9.25
Steel rails, 3 ft. and under	15.00 to 15.50

Malleable Grades:

Industrial	11.00 to 12.00
Railroad	11.00 to 12.00

Agricultural	11.00 to 12.00
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Special Grades:

Chemical borings	10.50 to 11.00
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▲ Semi-Finished Steel, Raw Materials, Bolts and Rivets ▲

Mill Prices of Semi-Finished Steel

Billets and Blooms

	Per Gross Ton
Rerolling, 4-in. and under 10-in., Pittsburgh	\$31.00
Rerolling, 4-in. and under 10-in., Youngstown	31.00
Rerolling, 4-in. and under 10-in., Cleveland	31.00
Rerolling, 4-in. and under 10-in., Chicago	32.00
Forging quality, Pittsburgh	36.00

Sheet Bars

(Open Hearth or Bessemer)

	Per Gross Ton
Pittsburgh	\$31.00
Youngstown	31.00
Cleveland	31.00

Slabs

	Per Gross Ton
Pittsburgh	\$31.00
Youngstown	31.00
Cleveland	31.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

Per Lb.

Grooved	1.60c.
Universal	1.60c.
Sheared	1.60c.

Wire Rods

(Common soft, base)

	Per Gross Ton
Pittsburgh	\$35.00
Cleveland	35.00
Chicago	36.00

Prices of Raw Material

Ores

Lake Superior Ores, Delivered Lower Lake Ports

	Per Gross Ton
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
Foreign Ore, c.i.f. Philadelphia or Baltimore	
	Per Unit
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algeria	8c. to 9c.
Iron ore, low phos., Swedish, average 68% iron	11c.
Iron ore, basic Swedish, average 65% iron	9c.
Manganese ore, washed 52% manganese, from the Caucasus	26c. to 28c.
Manganese ore, Brazilian, African or Indian, basic 50%	26c. to 28c.
Tungstenore, high grade, per unit, in 60% concentrates	\$12.50 to \$13.00
	Per Gross Ton
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, Atlantic seaboard	\$22.00 to \$24.00
	Per Lb.
Molybdenum ore, 85% concentrates of MoS ₂ , delivered	50c. to 55c.

Coke

Per Net Ton

Furnace, f.o.b. Connellsville	
prompt	\$2.50 to \$2.60
Foundry, f.o.b. Connellsville	
prompt	3.25 to 4.75
Foundry, by-products, Ch'go ovens	8.00
Foundry, by-products, New England, del'd	11.00
Foundry, by-product, Newark or Jersey City, delivered	9.00 to 9.40
Foundry, by-product, Phila.	5.00
Foundry, Birmingham	5.00
Foundry, by-product, St. Louis, f.o.b. ovens	8.00
Foundry by-prod., del'd St. Louis	9.00

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines	\$1.25 to \$1.35
Mine run coking coal, f.o.b. W. Pa. mines	1.40 to 1.50
Gas coal, 3/4-in., f.o.b. Pa. mines	1.70 to 1.80
Mine run gas coal, f.o.b. Pa. mines	1.50 to 1.60
Steam slack, f.o.b. W. Pa. mines	.35 to .55
Gas slack, f.o.b. W. Pa. mines	.90 to 1.00

Ferromanganese

	Per Gross Ton
Domestic, 80%, seaboard	\$80.00 to \$85.00
Foreign, 80%, Atlantic or Gulf port, duty paid

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	\$28.00 to \$30.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50%	\$88.50
75%	130.00
	Per Gross Ton Furnace
10%	\$35.00
11%	37.00
	12% 14 to 16% 39.00

Bessemer Ferrosilicon

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton	Per Gross Ton
10%	\$25.00	\$29.00
11%	26.00	31.00
12%	27.00	33.00

Silvery Iron

F.o.b. Jackson County, Ohio, Furnace

	Per Gross Ton	Per Gross Ton
6%	\$21.00	\$24.00
7%	21.50	25.00
8%	22.00	27.00
9%	22.50	29.00
10%	23.00	31.00

Delivered prices at Chicago are about 50c. a ton below this schedule.

Other Ferroalloys

Ferro tungsten, per lb. contained metal del'd	\$1.30 to \$1.40
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr, per lb. contained Cr, delivered, in carloads	11.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	24.50c. to 26.00c.
Ferrovanadium, per lb. contained vanadium, f.o.b. furnace	\$3.15 to \$3.65
Ferrocarbontitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	\$160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton	\$91.00
Ferrophosphorus, electric 24%, f.o.b. Alton, Ill., per gross ton	\$122.50
Silico-manganese, gross ton, delivered	\$135.00

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania	\$43.00 to \$46.00
Maryland	43.00 to 46.00
New Jersey	50.00 to 65.00
Ohio	43.00 to 46.00
Kentucky	43.00 to 46.00
Missouri	43.00 to 46.00
Illinois	43.00 to 46.00
Ground fire clay, per ton	7.00

Magnesite Brick

Per Net Ton

Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
Standard size	45.00

Chrome Brick

Per Net Ton

Standard size	\$45.00
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Small Rivets

(1/8-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	Per Cent Off List
Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5

Milled headless set screws, cut thread	.75 and 10
Up	

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c. to 1.65c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.89c.
Del'd New York	1.93c.
F.o.b. Cleveland	1.60c. to 1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c. to 1.80c.
C.i.f. Pacific ports	2.25c.
F.o.b. San Francisco mills	2.25c.

Billet Steel Reinforcing

	Base per Lb.
F.o.b. P'gh mills, 40, 50, 60-ft.	1.70c.
F.o.b. Birmingham, mill lengths	1.75c. to 1.80c.

Rail Steel

	Base per Lb.
F.o.b. mills, east of Chicago dist.	1.50c. to 1.55c.
F.o.b. Chicago Heights mill	1.60c. to 1.65c.
Del'd Philadelphia	1.84c. to 1.89c.

Iron

	Base per Lb.
Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.09c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c. to 1.65c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c. to 1.80c.
Del'd Cleveland	1.781/4c. to 1.831/4c.
Del'd Philadelphia	1.801/4c.
F.o.b. Coatesville	1.70c.
F.o.b. Sparrows Point	1.70c.
F.o.b. Lackawanna	1.70c.
Del'd New York	1.88c.
C.i.f. Pacific ports	2.05c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c. to 1.65c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c. to 1.80c.
Del'd Cleveland	1.781/4c. to 1.831/4c.
Del'd Philadelphia	1.801/4c.
F.o.b. Bethlehem	1.70c.
F.o.b. Sparrows Point	1.70c.
F.o.b. Lackawanna	1.70c.
Del'd New York	1.88c.
C.i.f. Pacific ports	2.05c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.65c. to 1.70c.
Wider than 6 in., P'gh	1.55c. to 1.60c.
6 in. and narrower, Chicago	1.75c. to 1.80c.
Wider than 6 in., Chicago	1.75c. to 1.70c.
Cooperage stock, P'gh	1.90c.
Cooperage stock, Chicago	2.00c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.00c. to 2.10c.
Bars, f.o.b. Chicago	2.00c. to 2.10c.
Bars, Cleveland	2.00c. to 2.10c.
Bars, Buffalo	2.00c. to 2.10c.
Shafting, ground, f.o.b. mill	2.45c. to 3.40c.
Strips, P'gh	2.25c. to 2.35c.
Strips, Cleveland	2.25c. to 2.35c.
Strips, del'd Chicago	2.53c. to 2.63c.
Strips, Worcester	2.50c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.40c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Merchant Trade

	Base per Keg
Standard wire nails	\$1.90 to \$2.00
Cement coated nails	1.90 to 2.00
Galvanized nails	3.95 to 4.05

Base per Lb.

	Base per Lb.
Polished staples	2.40c. to 2.50c.
Galvanized staples	2.60c. to 2.70c.
Barbed wire, galvanized	2.60c. to 2.70c.
Annealed fence wire	2.10c. to 2.20c.
Galvanized wire, No. 9	2.55c. to 2.65c.
Woven wire fence (per net ton to retailers)	\$65.00

To Manufacturing Trade

	Base per Lb.
Bright hard wire, Nos. 6 to 9 gage	2.20c. to 2.30c.
Spring wire	3.30c.

(Carload lots, f.o.b. Chicago)

	Base per Lb.
Wire nails	\$1.95 to \$2.05
Annealed fence wire	2.30c. to 2.40c. (lb.)

Bright hard wire to manufacturing trade

	Base per Lb.
Anderson, Ind., mill prices are ordinarily \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.	2.25c. to 2.35c.

Light Plates

	Base per Lb.
No. 10, blue annealed, f.o.b. P'gh	1.90c. to 2.00c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.00c. to 2.10c.
No. 10, blue annealed, del'd Phila.	2.19c. to 2.29c.
No. 10, blue annealed, B'ham	2.05c. to 2.10c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.05c. to 2.15c.
No. 13, f.o.b. Chicago dist.	2.15c. to 2.25c.
No. 13, del'd Philadelphia	2.34c. to 2.44c.
No. 13, blue annealed, B'ham	2.20c. to 2.35c.

Box Annealed, One Pass Cold Rolled

	Base per Lb.
No. 24, f.o.b. Pittsburgh	2.35c. to 2.45c.
No. 24, f.o.b. Chicago dist. mill	2.45c. to 2.55c.
No. 24, del'd Philadelphia	2.64c. to 2.74c.
No. 24, f.o.b. Birmingham	2.50c. to 2.65c.

Steel Furniture Sheets

	Base per Lb.
No. 24, f.o.b. P'gh	3.60c.

Galvanized

	Base per Lb.
No. 24, f.o.b. Pittsburgh	2.90c. to 3.00c.
No. 24, f.o.b. Chicago dist. mill	3.10c.
No. 24, del'd Cleveland	3.081/4c. to 3.181/4c.
No. 24, del'd Philadelphia	3.24c. to 2.29c.

Continuous Mill Sheets

	Base per Lb.
No. 10 gage	1.75c.
No. 13 gage	1.90c.

Tin Mill Black Plate

	Base per Lb.
No. 28, f.o.b. Pittsburgh	2.65c. to 2.70c.
No. 28, f.o.b. Chicago dist. mill	2.75c. to 2.80c.

Automobile Body Sheets

	Base per Lb.
No. 20, f.o.b. Pittsburgh	3.30c.

Long Ternes

	Base per Lb.
No. 24, 8-lb. coating, f.o.b. mill	3.35c. to 3.45c.

	Base per Lb.
No. 24, f.o.b. Pittsburgh	3.70c.

Vitreous Enameling Stock

	Base per Lb.
No. 24, f.o.b. Pittsburgh	3.70c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	\$5.00

Terne Plate

	Per Base Box
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Fabricated Structural Steel

New Projects of 91,000 Tons Among Largest of Year—Awards of 53,000 Tons Also Larger Than Usual

NEW projects and awards of fabricated structural steel reached a substantial total in the past week, with about 91,000 tons of new business and 53,000 tons of awards. The week's total of inquiry was the largest since early in November and one of the large totals of the year. A considerable part of the new tonnage is contributed by subway construction in New York, requiring 20,300 tons, and barges for the Inland Waterways Corp., Pittsburgh, 27,000 tons. A bridge in St. Louis calls for 6500 tons, and a building in Chicago for the Illinois Motor Association Club requires 2000 tons.

Awards of the week include 15,000 tons for a section of the New York elevated express highway, 5000 tons in an office building for the House of Representatives, Washington, 4825 tons in a section of Philadelphia subway, and 4300 tons in a viaduct over Market Street, West Philadelphia, for the Pennsylvania Railroad. Awards follow:

North Atlantic States

FRANKFORT, ME., 150 tons, granite shed, to F. P. Lyons Iron Works.
MAINE CENTRAL RAILROAD, 227 tons, four deck plate girder spans at New Meadows, Me., to Phoenix Bridge Co.
NEW YORK, 15,000 tons, section of West Side elevated express highway over New York Central Railroad to Fort Pitt Bridge Co.
NEW YORK, 900 tons, apartment building, 140 East Twenty-eighth Street, to Harris Structural Steel Co.
NEW YORK, 400 tons, apartment building, Seventy-fourth Street and Riverside Drive, to Lehigh Structural Steel Co.
NEW YORK, 3700 tons, Hampshire House apartments, 150 Central Park South, to Taylor-Fichter Steel Construction Co., previously reported to Fort Pitt Bridge Co.
NEW YORK CENTRAL RAILROAD, 240 tons, grade crossing elimination at Utica and Harmon, N. Y., to Phoenix Bridge Co.
NEW YORK, 430 tons, apartment building at 138 East Fortieth Street, to Fassler Iron Works.
NEW YORK, 1010 tons, apartment building at 59 West Twelfth Street, to Harris Structural Steel Co.
NEW YORK, 700 tons, West Virginia plant for Electro-Metallurgical Co., to American Bridge Co.
NEW YORK, 900 tons, apartment building, Riverside Drive and 104th Street, to Lehigh Structural Steel Co.
PHILADELPHIA, 4825 tons, Locust and Eighth Street subway, to American Bridge Co.
PENNSYLVANIA RAILROAD, 4300 tons, viaduct on Market Street, West Philadelphia, to American Bridge Co.
BALTIMORE, 1400 tons, Pier No. 11, for Canton Co., to Bethlehem Steel Co.
BALTIMORE, 400 tons, high school for colored pupils, to Dietrich Brothers.
WASHINGTON, 1000 tons, Theodore Roosevelt High School, to Lehigh Structural Steel Co.
WASHINGTON, 5000 tons, office building for House of Representatives, to American Bridge Co.

The South

POINT PLEASANT, W. VA., 2000 tons, superstructure for State bridge over Kanawha River, to Independent Bridge Co.
MOBILE, ALA., 100 tons, addition to Alabama State docks wharf shed, to Virginia Bridge & Iron Co.
STATE OF LOUISIANA, 1500 tons, highway bridges; 200 tons to Lakeside Bridge & Steel Co., and 1300 tons to Vincennes Bridge Co.

Central States

ZANESVILLE, OHIO, 275 tons, three barges for Muskingum River Gravel Co., and

land Waterways Corp.; bids close Dec. 30.

PITTSBURGH, 1000 tons, three tow boats for Inland Waterways Corp.; bids close Dec. 12.

Central States

CHICAGO, 700 tons, Verdi Junior High School.
CHICAGO, 1500 tons, American Shipbuilding Co., plates for ballast tanks.
CHICAGO, 2000 tons, miscellaneous school work.
CHICAGO, 13,000 tons, elevated railway.
CHICAGO, 2000 tons, Illinois Motor Association Club.
ST. LOUIS, 6500 tons, approaches to bridge connecting St. Louis with East St. Louis.

Western States

UNION PACIFIC RAILROAD, 500 tons, viaduct at Omaha, Neb.
OKLAHOMA CITY, 500 tons, Post Office.
SACRAMENTO, CAL., 108 tons, bridge over Richardson Bay, Marin County; bids opened.
LOS ANGELES, 3000 tons, plates, 38 to 51-in. welded steel pipe; bids opened.
ALAMEDA, CAL., 300 tons, theater.

Canada

ST. BONIFACE, QUE., 1000 tons, bridge over Yamachiche River for Quebec Department of Public Works.
COBOURG, ONT., 400 tons, hotel for Harry Alexander, care of Arlington Hotel.
TORONTO, 1500 tons, Queen Victoria School for Board of Education.
LONDON, ONT., 300 tons, Richmond Street bridge for City Council.
WINNIPEG, 3000 tons, Norwood Bridge, cost to be shared by Winnipeg and St. Boniface.

Western States

LINCOLN, NEB., 300 tons, addition to Chicago, Burlington & Quincy viaduct, to Vierling Steel Works.
PHOENIX, ARIZ., 900 tons, office building, to Kansas City Structural Steel Co.
OKLAHOMA CITY, 4000 tons, bank building, to Capitol Steel & Iron Co. and sublet to McClintic-Marshall Co.
OAKLAND, CAL., 950 tons, Paramount Theater, to Moore Dry Dock Co.
SAN DIEGO, CAL., 521 tons, First Street bridge, to Virginia Bridge & Iron Co.

Canada

ST. JOHN, N. B., 500 tons, building for Snowflake Lime, Ltd., to St. John Dry Dock Co.

STRUCTURAL PROJECTS PENDING

Inquiries for fabricated steel work include the following:

North Atlantic States

EVERETT, MASS., 150 tons, New England Fuel & Transportation Co. coal pocket.
PROVIDENCE, R. I., 100 tons, Brown University unit.
BROOKLYN, 300 tons, alterations to plant of E. W. Bliss Co.
NEW YORK, 12,000 tons, route 108, sections 10 and 11, Queens subway; bids in Dec. 23.
NEW YORK, 7300 tons, route 107, section 9, subway; bids in Dec. 16.
NEWARK, N. J., 2000 tons, subway.
STATE OF NEW JERSEY, 170 tons, bridge at Musconetcong, N. J.
BALTIMORE, MD., 1000 tons, building for Enoch Pratt Free Library.
WILMINGTON, DEL., unstated tonnage, contagion unit for Wilmington General Hospital.
COLLEGEVILLE, PA., 250 tons, science building for Ursinus College.
ARMSTRONG COUNTY, PA., 1900 tons, highway bridge at Kittanning; bids close Dec. 18.
INDIANA COUNTY, PA., 300 tons, highway bridge; bids close Dec. 18.
PITTSBURGH, 27,000 tons, barges for In-

Railroad Equipment

Canadian National to Buy 4000 Cars and Build 500

ALTHOUGH domestic railroad equipment building has not yet received any impetus, except for the construction of cars in railroad companies' own shops, the Canadian market is more active, with inquiries from the Canadian National for 4000 freight cars and an announcement that this road will build an additional 500 refrigerator cars in its own shops. The Canadian Pacific is inquiring for 135 freight cars and 55 passenger cars. The St. Louis Southwestern is in the market for 10 locomotives. Details follow:

Carnegie Steel Co. has ordered 65 freight cars, of which 20 flat cars of 70-ton capacity will be built by Pressed Steel Car Co., 15 special flat cars of 70-ton capacity by Standard Steel Car Co. and 30 gondola cars of 70-ton capacity by American Car & Foundry Co.

Seaboard By-Products Coal Co., Pittsburgh, is asking for bids for the repair of 248 55-ton hopper cars.

Sanitary District of Chicago is in the market for 25 air dump cars.

St. Louis Southwestern is inquiring for 10 locomotives of the 4-8-4 type.

Canadian Pacific is inquiring for 100 flat cars, 35 air dump cars and 55 passenger cars.

Canadian National is inquiring for 3000 steel-frame box cars of 50-ton capacity, 500 composite gondola cars of 70-ton capacity and 500 composite general service cars of 50-ton capacity, and is also in the market for steel and other materials for 500 refrigerator cars to be built in company's own shops at London, Ont., and Transcona, Man. Canadian National is now building 10 locomotives of the 2-8-0 type at its Transcona shops.

▲▲▲ Non-Ferrous Metal Markets ▲▲▲

Copper Inactive—Tin Stagnant—Lead Quiet—Zinc Stronger

NEW YORK, Dec. 9.

Copper

Custom smelters, after raising the price of electrolytic copper a week ago to 11.50c. a lb., delivered in the Connecticut Valley, are now offering the metal at 11c. Lack of buying is offered as the explanation. In contrast to a fairly active market a week ago, domestic demand has dwindled to small proportions. In this market, as in the other major non-ferrous metals, the tendency of consumers is to buy as little as possible, partly because of inventorying at the end of the month. Foreign consumers also have been rather slow to make purchases, and the total for the month to date has been only 4700 tons. The decline in the domestic price has had some influence in retarding buying from across the water. Primary producers still hold their domestic price at 12c., delivered in the Connecticut Valley, and there has been no change in the quotation of Copper Exporters, Inc., which is 12.30c., c.i.f. usual European ports. There are some indications that this quotation may be lowered before the end of the month, because of the spread between the domestic quotations of the custom smelters and the primary producers. The latter have made practically no sales, or very few, thus far this month, except to regular customers in special cases. Lake copper is rather inactive and still held at 12c. to 12.12½c., delivered.

Tin

Stagnation practically rules this market and almost no business is reported. Consumers are well covered ahead and are not interested in the present low prices, which are close to the lowest this year. It is intimated that there may be some buying at a possible new low point in the future, the reasonableness of this being due to the very large stocks of metal here and abroad. Spot Straits tin today is quoted at 25c., New York. Prices in London today were also very close to the low point this year, with spot standard quoted at £111 12s. 6d., future standard at £112 17s. 6d. and spot Straits at £115 17s. 6d. The Singapore price today was £116 5s.

Lead

Consumers are entering the market only for immediate needs, and sales are confined to carload and small lots for early delivery. Books of producers have been opened since the first of the month for January ship-

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Dec. 9	Dec. 8	Dec. 6	Dec. 5	Dec. 4	Dec. 3
Lake copper, New York.....	12.12½	12.12½	12.12½	12.12½	12.12½	12.12½
Electrolytic copper, N. Y.*.....	10.75	10.75	10.75	10.75	11.00	11.00
Straits tin, spot, N. Y.	25.00	25.00	25.37½	25.37½	25.70
Zinc, East St. Louis.....	4.20	4.17½	4.15	4.15	4.10	4.10
Zinc, New York.....	4.55	4.52½	4.50	4.50	4.45	4.45
Lead, East St. Louis.....	4.95	4.95	4.95	4.95	4.95	4.95
Lead, New York.....	5.10	5.10	5.10	5.10	5.10	5.10

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

ment, but orders for that delivery have thus far been very few. Prices are firm and unchanged at 4.95c., St. Louis, and 5.10c., New York, the latter being the contract quotation of the leading interest.

Zinc

Prices for prime Western zinc are gradually becoming stronger, and the market today is quotable at 4.20c., East St. Louis, or 4.55c., New York, with possibly small amounts available at 4.17½c., East St. Louis. These prices apply only to December delivery. For January and February a small premium is asked, but buying for those positions is insignificant. Stocks in consumers' hands are believed to be very low and, as in the case of lead, it seems probable that there will be some fairly large buy-

ing early in January, if not before. An encouraging feature is the statistics for November showing a decrease in production of about 9000 tons, which is expected to be still larger for December. There was an increase in stocks of refined metal, but the increase was largely in high-grade zinc, there having been a decrease of about 400 tons in stocks of prime Western zinc. Ore prices are unchanged, with sales last week at \$25 to \$26 a ton. Production was about 8000 tons, with shipments approximately 8500 tons, leaving the surplus close to 46,500 tons, or practically the same as the high for the year.

Antimony

Chinese metal is in light demand, with quotations for spot delivery at

New York, Chicago or Cleveland Warehouse

	Delivered Prices, Base per Lb.
High brass.....	18.67½c.
Copper, hot rolled, base sizes.....	21.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	23.25c.
Seamless Tubes—	
Brass.....	23.50c.
Copper.....	22.75c.
Brass Rods.....	16.87½c.
Brazed Brass Tubes.....	26.12½c.

New York Warehouse

	Delivered Prices, Base per Lb.
Zinc sheets (No. 9), casks.....	9.75c. to 10.25c.
Zinc sheets, open.....	10.75c. to 11.25c.

Metals from New York Warehouse

	Delivered Prices, per Lb.
Tin, Straits pig.....	27.50c. to 28.50c.
Tin, bar.....	29.50c. to 30.50c.
Copper, Lake.....	12.75c. to 13.00c.
Copper, electrolytic.....	12.50c. to 12.75c.
Copper, casting.....	12.25c. to 12.50c.
Zinc, slab.....	5.75c. to 6.75c.
Lead, American pig.....	6.00c. to 7.00c.
Lead, bar.....	8.00c. to 9.00c.
Antimony, Asiatic.....	9.50c. to 10.50c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	24.00c. to 25.00c.
Alum. ingots, No. 12 alloys.....	23.00c. to 24.00c.
Babbitt metal, commercial grade.....	25.00c. to 35.00c.
Solder, ½ and ¼.....	19.00c. to 20.00c.

Metals from Cleveland Warehouse

Delivered Prices, per Lb.

Tin, Straits pig.....	29.50c.
Tin, bar.....	31.50c.
Copper, Lake.....	13.13c.
Copper, electrolytic.....	13.13c.
Copper, casting.....	12.75c.
Zinc, slab.....	5.50c. to 5.75c.
Lead, American pig.....	5.75c. to 6.00c.
Lead, bar.....	8.50c.
Antimony, Asiatic.....	11.50c.
Babbitt metal, medium grade.....	15.25c.
Babbitt metal, high grade.....	34.00c.
Solder, ½ and ¼.....	19.50c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses.

Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	8.75c.
Copper, hvy. and wire	8.25c.
Copper, light and bot-	
toms.....	7.25c.
Brass, heavy.....	5.00c.
Brass, light.....	4.00c.
Hvy. machine compo-	
sition.....	7.25c.
No. 1 yel. brass turn-	
ings.....	5.00c.
No. 1 red brass or	
compos. turnings.....	7.00c.
Lead, heavy.....	4.00c.
Lead, tea.....	2.50c.
Zinc.....	2.25c.
Sheet aluminum.....	7.50c.
Cast aluminum.....	6.00c.

7.10c., New York, duty paid, and with futures at 7c.

Nickel

Long-established prices still prevail, with wholesale lots of ingot nickel quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum

Virgin metal, 98 to 99 per cent pure, is obtainable at the published price of 22.90c. a lb., delivered.

Non-Ferrous Metals at Chicago

CHICAGO, Dec. 9.—Quotations are lower on tin and higher on zinc in a

dull market. Sales are small but steady in the old metal market in which supplies are measurably larger.

Prices per lb. in carload lots: Lake copper, 12.12½c.; tin, 26c.; lead, 5.05c.; zinc, 4.27½c.; in less-than-carload lots, antimony, 8.25c. On old metals we quote copper wire, crucible shapes and copper clips, 8c.; copper bottoms, 7c. to 7.50c.; red brass, 7c. to 7.50c.; yellow brass, 5c. to 5.50c.; lead pipe, 3.75c. to 4c.; zinc, 1.50c. to 1.75c.; pewter, No. 1, 15c.; tin-foil, 16c.; block tin, 22c.; aluminum, 6.50c. to 7c.; all being dealers' prices for less-than-carload lots.

compressed sheet steel have again been reduced.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:

No. 1 heavy melting steel	\$10.25 to \$10.75
No. 2 heavy melting steel	9.75 to 10.25
Compressed sheet steel	9.75 to 10.00
Light bundled sheet stampings	8.50 to 9.00
Drop forge flashings	9.75 to 10.00
Machine shop turnings	5.00 to 5.50
Short shoveling turnings	7.75 to 8.00
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	10.00 to 10.50
No. 1 busheling	9.50 to 10.00
Pipes and flues	6.50 to 7.00
Steel axle turnings	9.50 to 10.00

Acid Open-Hearth Grades:

Low phos., billet bloom and slab crops	16.50 to 17.00
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Blast Furnace Grades:

Cast iron borings	7.25 to 7.50
Mixed borings and short turnings	7.25 to 7.50
No. 2 busheling	6.75 to 7.00

Cupola Grades:

No. 1 cast	12.00 to 12.50
Railroad grate bars	10.00 to 10.50
Stove plate	10.50 to 11.00
Rails under 3 ft.	16.00 to 16.50

Miscellaneous:

Rails for rolling	16.25 to 16.50
Railroad malleable	12.50 to 13.00

Detroit Scrap Market At a Standstill

DETROIT, Dec. 9.—The scrap market is virtually at a standstill, with consumers unwilling to contract for material until their own position shows signs of improvement. The last boatload of scrap until next spring will be shipped to Buffalo this week.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov. steel	\$9.75 to \$10.25
Borings and short turnings	4.75 to 5.25
Long turnings	3.75 to 4.25
No. 1 machinery cast	10.00 to 10.50
Automotive cast	11.50 to 12.00
Hydraul. comp. sheets	9.25 to 9.75
Stove plate	7.25 to 7.75
New No. 1 busheling	8.25 to 8.75
Old No. 2 busheling	3.50 to 4.00
Sheet clippings	6.50 to 7.00
Flashings	8.25 to 8.75

Inland Steel Co. to Use Continuous Sheet Process

The Inland Steel Co., Chicago, has consummated a license contract with the American Rolling Mill Co. for the use of the continuous sheet mill patent and is closing negotiations for a four-high strip mill.

Mystic Buys Spanish Ore

The Mystic Iron Works, Everett, Mass., has contracted with F. C. Strick & Co., owners of the steamers Thala and Brika, to transport 200,000 tons of iron ore from Almeria, Spain, to Everett. The first delivery on this contract, one of 6500 tons, was made last week. The blast furnace has had several lots of this iron before, as well as North African and New Zealand ores.

Missouri Fire Brick Co., Vandalia, Mo., has arranged for the entire sale of its refractory materials by the Christy Fire Brick Co., 620 South Second Street, St. Louis.

Reinforcing Steel

Pending Projects of 8600 Tons—Awards Light

LETTINGS of reinforcing steel the past week were in small volume, totaling only 3100 tons and including 2000 tons for a bridge at Vancouver, B. C. New inquiries call for 8600 tons, compared with 1200 tons in the previous week. A bridge at Cleveland will take 2400 tons. Awards follow:

BOSTON, 165 tons, L Street bath house, to Barker Steel Co.
BOSTON, 125 tons, Professional Arts building, to Concrete Steel Co.
MINEOLA, N. Y., 100 tons, barracks at Mitchel Field, to Kalman Steel Co.
STATE OF NEW JERSEY, 300 tons, supplementary joint trunk sewer between Essex and Union counties, to Igoe Brothers.
BUFFALO, 250 tons, school No. 64, to a local bidder.
CHICAGO, 150 tons, Lutheran Deaconess Home, to Joseph T. Ryerson & Son.
LOS ANGELES, 300 tons, apartment building, Las Palmas and Franklin Streets, to an unnamed bidder.
SEATTLE, 100 tons, for Puget Sound Navy Yard, to Pacific Coast Steel Corp. and Northwest Steel Rolling Mills.
VANCOUVER, B. C., 2000 tons, Burrard Street bridge, to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

NEW LONDON, CONN., 500 tons, Coast Guard barracks; general contract bids Dec. 19.
NEW YORK, 750 tons, superstructure for New York Telegram building; general contract placed with Industrial Engineering Co., New York.
NEW YORK, 900 tons, foundations for penitentiary, Riker's Island; P. J. Carlin Construction Co., New York, low bidder on general contract.
BROOKLYN, unstated tonnage, warehouse for H. C. Bohack Co., Inc.; general contract bids Dec. 20.
DANNEMORA, N. Y., 300 tons, State prison; revised general contract bids to be taken Dec. 19.
ATTICA, N. Y., unstated tonnage, State prison; general contract bids in January.
WESTCHESTER COUNTY, N. Y., 1000 tons, two bridges at New Rochelle and one at White Plains for County Park Commission.
MAMARONECK, N. Y., 150 tons, high

Cleveland Iron and Steel Market

(Concluded from page 1795)

creased by this business, there is a falling off in the demand from stove and barrel manufacturers. Quite a few consumers have closed contracts for the first quarter, these being at the minimum prices on grades now carrying a spread in quotations. These prices are the same as have been prevailing recently. For current orders, most black sheet business is going at 2.35c., that being the minimum price for car lots. Demand for auto body seconds has become more active. These are selling at \$38 per ton, with concessions of \$1 a ton for short lengths.

Old Material

The scrap market continues dull and weak. Mills are taking very little material and are buying no scrap. Yard dealers, whose stocks are said to be the largest in several years, are making small-lot purchases. Prices on heavy melting steel and

Motor Car Output of 3,500,000 Units

Will Be Lowest Since 1922

DETROIT, Dec. 8.

LARGELY on account of a drop of some 26,000 units in Ford production, November output of motor cars dipped to a new low mark for the year. Suspension of activities by other makers, including Studebaker and Nash during the latter part of the month also contributed to the poor showing. Although the National Automobile Chamber of Commerce estimates assemblies last month at 146,185 cars for the United States and Canada, final figures probably will be 130,000 to 135,000.

Chevrolet's November record was 47,257 units, or more than one-third the total production. Ford's operations aggregated 52,000 cars, so that Ford and Chevrolet together turned out more than 75 per cent of all cars manufactured. This serves to emphasize not only the dominant positions occupied by these two leaders, but also the rather sickly condition of the remainder of the industry. The Chrysler Corp. shipped 7992 units in November, and it is assumed that the total production of its various divisions was near that figure. Buick's output was 7177 cars. Thus, the activities of four companies—Ford, Chevrolet, Chrysler and Buick—accounted for almost 115,000 units, leaving the remaining 15,000 units, or about 9 per cent, to be divided among all other companies.

There is a good chance that December's record will better that in the same month last year, which was 125,000 units, but it is doubtful whether it will equal even the poor showing of last month. Chevrolet is reported to have a schedule of 60,000 cars this month and 75,000 in January, while Hudson-Essex has increased production to 2000 cars a week.

The month's position, however, will depend considerably on what Ford does. Ford officially is working three days a week, but actual operations are cloaked in secrecy. The Rouge plant is ready to go down for the last two

November automobile production in United States and Canada was 130,000 to 140,000 cars, the lowest mark of the year. December's showing is likely to be 125,000 units.

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Nineteen-thirty output of motor cars will be less than 3,500,000, the poorest year since 1922.

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Ford made 52,000 cars last month, compared with 78,000 in October and 97,000 in September.

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Chevrolet's November production was 47,257 units, with a schedule of 60,000 for December and 75,000 for January.

weeks of December. Ford's steel mills are said to have been running intermittently to avoid piling too much material. It is not surprising that this should be the case, for the low price of steel makes it possible for Ford to purchase from outside sources whatever steel is needed considerably cheaper than it can be made at the Rouge works.

The eight-cylinder Ford has become the most talked-about subject in Detroit. One story has Ford ready to employ 25,000 men at the Highland Park plant for the proposed car; another states that dealers and distributors have been told to forget about the possibility of an eight. It is safe to say that no tools for an eight-cylinder car have been purchased and its production is not a matter of the near future.

January does not promise much improvement in automobile output. The general opinion here is that January will be little better than November and December, February will bring a

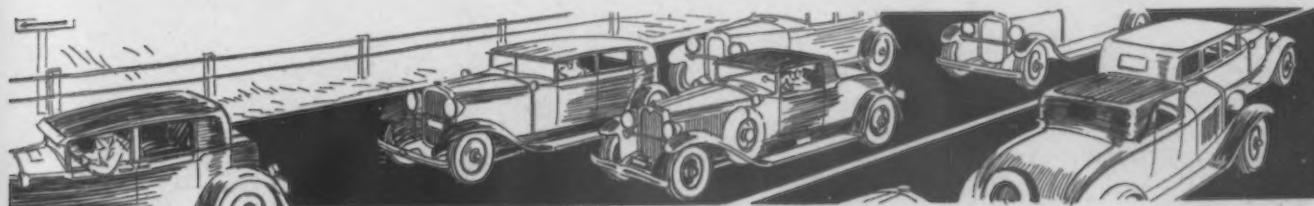
gain stimulated by the January shows, and March should continue the upward trend. No one in close touch with the industry is expecting anything remotely resembling a boom in 1931.

Chrysler Moving from Highland Park

THE Chrysler people are preparing to offer new Dodge and DeSoto models next month and, accordingly, are said to have a production program of 5000 Dodges in December. They are reported also to be concentrating the manufacture of all Chrysler-built cars at the Dodge and Jefferson Avenue Chrysler plants, leaving the Highland Park factory for the service departments. It is probable that one of the reasons for the shift is the unfavorable tax situation in Highland Park, which, although surrounded by Detroit, is a separate municipality. It is well-known locally that the heavy tax imposed on the Ford Motor Co. was one of the reasons why the company moved away from Highland Park, virtually abandoning its plant there. The new Chrysler arrangement is said to call for production of the DeSoto in the Dodge factory, which also will make all stampings for Chrysler-built cars. For a long time the Dodge foundry has been turning out castings used by the various Chrysler divisions other than Dodge and apparently the same policy is to be followed in the manufacture of other parts.

Little Change in Employment

EMPLOYMENT conditions in Detroit have changed little in recent weeks. Gains in one direction have been offset by losses elsewhere. The Chevrolet company has announced that in its 20 domestic plants it has 28,500 men at work, while Lincoln has taken on 800 men in the past month and still is adding 100 men a week as its gets its 1931 models into production. The same situation exists at Oakland-Pontiac, where plans are under way for manufacture of new cars.



Durant's plans for the small Mathis seem indefinite, with vague talk about output beginning in January. However, the 100,000 cars originally scheduled for next year have shrunk to 50,000, and now the naming of figures is studiously avoided. Buick has been going fairly well, but will close its plant for inventory the latter part of the month.

Nineteen-thirty automobile production for the United States and Canada is almost sure to be less than 3,500,000 cars, with a possibility that it will be nearer 3,475,000. This is based on output for the first 11 months plus an estimated 125,000 to 130,000 cars for December. It is the poorest showing since 1922, when 2,646,229 cars were manufactured. It is only the third time since 1922 that production has fallen under four million cars.

Hudson is preparing what is understood to be a de luxe job to be announced soon. It will consist of a

body and radiator style radically different from its regular line and will be designed to appeal to those who like a racy, sporty car. It will be stream-lined with a V-type radiator. The body is being made by Murray rather than in the Hudson plant. The vogue for the V-type radiator, started by Cord, has spread rapidly, with Chrysler, Reo, the sport-type Hudson and the new Marmon 16 following Cord's example.

Low Copper Prices Help Chevrolet

HERE is an interesting story about Chevrolet's radiator shell. The rustless steel people have been eager to see Chevrolet do what Ford already has done, go over to a rustless steel radiator shell. It so happens that Chevrolet is one of the few makers which still use copper for this part, plating it with chromium. The company is said to have been almost

ready to order the change to rustless steel when copper dropped to 9c. a lb. In view of the comparatively high cost of rustless steel, the copper price proved to be too much of a bait. The result is a chromium-plated shell with a copper base.

Steel makers are fighting hard to keep automobile companies from reverting to the use of cast iron brake drums for heavy cars. It is said that they have worked out some new ideas which may save a considerable portion of the business, amounting in the aggregate to 75,000 tons a year.

The Marmon Motor Car Co. will shortly resume building bodies in its plant No. 3 at Indianapolis. For some time bodies have been trucked from the Hayes body plant at Grand Rapids, Mich. Marmon will operate its own body painting and trimming department, while the same plant will house a division of the Hayes company, which will fabricate the bodies.

FORD MOTOR CO. OPENS NEW ASSEMBLY PLANT AT EDGEWATER, N. J.



THE Ford Motor Co. last week started operations in a new automobile assembly plant on the Hudson River at Edgewater, N. J., opposite 107th Street, New York. The new plant was built so that automobiles could be loaded directly on steamers for shipment to South American countries.

The Edgewater plant has a capacity of 800 cars a day and employs 6000 men. It is running quite full due to the fact that this is the period of seasonal demand for motor cars in South America. The building is 1500 ft. long by 360 ft. wide, with a craneway 60 ft. wide the entire length of the building.

The chassis, or final assembly, line on the main floor is 850 ft. long. It travels about 210 in. per min., which allows about 48 min. from the time the first minor assembly is placed on the line until the finished car is driven off under its own power.

Bodies are assembled on the second floor of the Edgewater plant. This department has 225,000 sq. ft. of floor space and is capable of handling 400 bodies in 8 hr. There is one overhead conveyor in this department on which 500 bodies can be hung at one time.



... PERSONALS ...

HILAND G. BATCHELLER, who has been vice-president of Ludlum Steel Co., Waterbury, N. Y., since 1919, has been made president. Shortly after graduating from Wesleyan University in 1907, he entered the employ of the Carnegie Steel Co. In 1913 he went to Pittsburgh, going through the training school maintained by the Carnegie company, and later returned to the sales department of the company in New York. He left that com-



H. G. Batcheller

pany in 1916 to become assistant to the president of the Ludlum Steel Co., and three years later was elected vice-president. Mr. Batcheller is also president of the Krupp Nirosta Co., New York, and of the Associated Alloy Steel Co., Cleveland.

OWEN K. PARMITER, metallurgical engineer, Firth-Sterling Steel Co., McKeesport, Pa., was scheduled to address the Hartford chapter of the American Society for Steel Treating, Dec. 9, on "Super High-Speed Steels."

L. H. VAN DIKE has been made purchasing agent of the John A. Roebling's Sons Co., Trenton, N. J., succeeding the late Joseph W. Gaskill. Mr. Van Dike for a number of years was assistant to Mr. Gaskill.

H. J. FREYN, president, Freyn Engineering Co., Chicago, returned to the United States on Nov. 19 from a visit to England and Russia. H. W. FITZGERALD, G. W. LANGE, H. T. SMITH and H. L. ZIMMERMAN, of the same company, will sail on Dec. 16 for Russia to join the group of Freyn engineers already there.

RALPH H. SWEETSER has announced a consulting service in blast furnace practice with an office in Columbus, Ohio, and also at 17 Battery Place, New York, dealing especially in problems relating to the raw materials, production and uses of pig iron and coke. For the past 10 years Mr. Sweetser has been in the executive division of the American Rolling Mill Co., as assistant to first vice-president, and to vice-chairman J. H. Frantz, with headquarters at Columbus. From 1921 to January, 1930, Mr. Sweetser was also vice-president of the Portsmouth By-Product Coke Co., with by-product coke ovens at Portsmouth, Ohio, and coal mines at Freeburn in Pike County, Ky. Half ownership in this company was sold by the American Rolling Mill Co. in January to the Wheeling Steel Corp., the other joint owner.

Mr. Sweetser's blast furnace operating experience was obtained in the blast furnace department of the Maryland Steel Co., Sparrows Point, Md.; in western Pennsylvania, eastern Ohio, eastern Tennessee, Sault Ste. Marie, Ont., and Columbus. As superintendent of blast furnaces and docks of the Algoma Steel Corp. at the Canadian "Soo," Mr. Sweetser was the first one to operate the blast furnaces of the Lake Superior Corp. One of the blast furnaces was the largest charcoal blast furnace in the world and established a tonnage record for charcoal blast furnaces that has not yet been exceeded. From 1913 to 1916 he was president and general manager of the Thomas Iron Co. in the Lehigh Valley, manufacturer of Thomas-vanadium pig iron.

In problems pertaining to the mining and cleaning of coal, Mr. Sweet-

ser will be associated with the firm of Stuart, James & Cooke, Inc., engineers, 17 Battery Place, New York. This firm also maintains offices at 62 London Wall, London, and in Moscow and Kharkov, U. S. S. R., and has associated firms representing it in Paris, Berlin and Warsaw.

CHARLES T. RAY, since 1924 vice-president in charge of manufacturing of B. F. Avery & Sons, Louisville,



Charles T. Ray

Ky., maker of agricultural implements, has been elected president, to fill the vacancy caused by the death of William Black. He became identified with the Texas branch of the company in 1909 and the following year was transferred to the home office. Mr. Ray was made factory manager in 1918 and six years later vice-president.

J. S. ERVIN, vice-president and for the past six years manager of sales of the H. H. Robertson Co., Pittsburgh, has resigned to become affiliated with one of the leading steel companies. He will continue as a director of the Robertson company. Mr. and Mrs. Ervin are leaving shortly on an extended sea voyage. Upon their return definite announcement will be made as to Mr. Ervin's new connection.

WARREN F. PERRY, long identified with industrial activities in the Mahoning Valley, has been elected secretary of the Ohio Manufacturers' Association, effective Jan. 1, 1931, with headquarters at Columbus. He will succeed LEROY B. WEBSTER, formerly of Cleveland, who has resigned. For



R. H. Sweetser

many years Mr. Perry was identified with the iron and steel industry, having served as secretary to the late Thomas McDonald, who was general superintendent of the Carnegie Steel Co. at Youngstown. Later he was safety director of the Brier Hill Steel Co., Youngstown, but retired from that position when the company was taken over by the Youngstown Sheet & Tube Co.

L. E. CREIGHTON has been appointed vice-president and general manager of the Union Drawn Steel Co., Beaver Falls, Pa., a subsidiary of the Re-



L. E. Creighton

public Steel Corp. Mr. Creighton has been identified with the Union Drawn organization for the past 20 years, having served as vice-president in charge of operations since 1927.

DR. LILLIAN M. GILBRETH was the guest of the Employers' Association of Eastern Massachusetts at its annual meeting in Boston on Dec. 10.

C. E. BRODHEAD, for 25 years prominently identified with the bolt and nut industry, has become affiliated with the bolt and nut department of the Bethlehem Steel Corp. Practically his entire career was with the Scranton Bolt & Nut Co., the closing 10 years in the capacity of vice-president and general manager of sales. When the Scranton company was merged with the Wrought Iron Co. of America, Mr. Brodhead was appointed New York and New England manager, with sales offices in New York.

RALPH S. MACPHERRAN, chief chemist of Allis-Chalmers Mfg. Co., Milwaukee, and an outstanding metallurgist in cast iron, has been awarded the J. H. Whiting gold medal of the American Foundrymen's Association for his many valued contributions to the foundry industry. Mr. MacPher-

ran, for many years a prominent and active contributor to the committee work of the American Foundrymen's Association and the American Society for Testing Materials, has been identified with the iron and steel industry for nearly 30 years.

T. USAMI, for the past four years manager of the metal department, Mitsui & Co., 65 Broadway, New York, is returning this month to the main office of the company in Tokio, Japan, and will be succeeded in New York by T. HIROSHIMA, who was in the New York office from 1922 to 1926.

ARTHUR J. HERSCHEMANN, who represents in this country at 50 Church Street, New York, the Witkovitz steel works in Czechoslovakia, has returned from a visit of some weeks in Europe.

W. T. HAGGARD, general sales manager of the J. A. Fay & Egan Co., Cincinnati, manufacturer of woodworking machinery, has returned from a business trip by airplane to the Pacific Coast, Dallas, Texas, Tulsa, Okla., and Kansas City, Mo.

E. K. KLINGELHOFER has been elected president of the Pittsburgh Bridge & Iron Co., succeeding his father, the late George E. Klingelhoffer.

DR. ANCEL ST. JOHN, president, St. John X-Ray Service Corp., New York, will address the Steel Founders' Society of America at the Hotel Sherman, Chicago, Dec. 11. He will give an illustrated lecture on the value of the X-ray in inspecting various types of steel castings.

C. M. BURGESS, president, Burgess-Norton Mfg. Co., Geneva, Ill., has been elected president of the National Standard Parts Association. V. W. OLSEN, president of the Automatic Service Co., Minneapolis, was elected vice-president.

HENRY FORD was guest of honor at the annual dinner of the Illinois Manufacturers' Association, Dec. 9, at the Stevens Hotel, Chicago. He was decorated with a gold medal in recognition of his achievements in the industrial world and his contribution to the advancement of modern civilization. Speakers at this dinner were HENRY WENTWORTH BEATTY, president, Canadian Pacific Railway; ARTHUR BRISBANE; Senator-elect JAMES HAMILTON LEWIS and B. C. FORBES, New York.

J. E. KREPS, who was vice-president and in charge of steel plant operations of the Bourne-Fuller Co., Cleveland, prior to that company's

merger with the Republic Steel Corp., has become associated with Smead & Small, Inc., manufacturers' agents, Cleveland, and has been made manager of a new steel specialties department formed by that organization. Mr. Kreps was for years vice-president and general superintendent of the Union Rolling Mills Co., Cleveland.

JAMES A. FISHER, assistant district sales manager of the New York office of Wheeling Steel Corp., has been appointed Philadelphia district sales manager, succeeding L. J. LOWE, who will be transferred to the New York office.

S. LIVINGSTON MATHER, of the Cleveland-Cliffs Iron Co., Cleveland, was elected president of the American Mining Congress at its annual meeting last week in Washington. J. B. PUTMAN, Pickands, Mather & Co., Cleveland, was elected a director for two years.

Large Reduction in Magnesium Prices

The Dow Chemical Co., Midland, Mich., has announced a large reduction in magnesium metal prices. This company has pioneered in the development of magnesium in this country.

In 1915 the average price for magnesium was \$5 a lb. Early this year prices ranged from 80c. to \$1. Two very substantial price reductions have since taken place. In March, reduced prices were announced, ranging from 65c. to 80c. a lb., and now comes a reduction to 48c. a lb. in 100-lb. lots or more. Total reductions since the first of the year amount to 52c. a lb. on 100-lb. lots and 32c. a lb. on larger quantities. Manufacturing economies, due to improvements in plant processes and larger production, are reported as responsible for these reductions.

The consistent decrease in magnesium metal prices has brought an increase in consumption. In 1921 consumption in this country amounted to 48,000 lb.; in 1929 the total was over 900,000 lb.

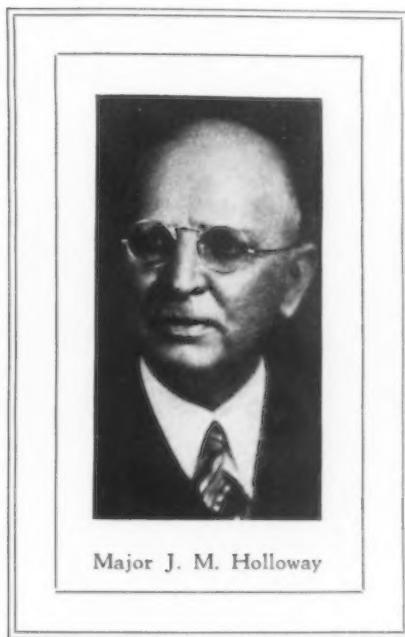
The use of magnesium metal has grown for products in which light weight, combined with a high degree of strength and stiffness, are essential factors. In airplane manufacture the lightness of magnesium alloys has resulted in its use for struts, chairs, instrument boards, engine parts and other units.

Ford Motor Buys Iron Mine

The Ford Motor Co. has increased its iron ore holdings in the Lake Superior district by the purchase of the Walpole mine at Iron Mountain, Mich. This mine, which has been inactive for many years, has considerable ore of low-grade close enough to the surface to allow it to be worked as an open pit mine.

▲ ▲ ▲ OBITUARY ▲ ▲ ▲

MAJOR JAMES M. HOLLOWAY, manager of sales for the American Steel & Wire Co., at Kansas City, Mo., died on Dec. 3. Although he had not been in good health for several years, his death was unexpected by his many friends. Major Holloway was born at Adrian, Mich., in 1867. He was apprenticed as a foundryman, following which he gave 40 years of service to



Major J. M. Holloway

the iron and steel and the hardware industries. He held the rank of major in the United States Army, and was with the expeditionary forces in Cuba at the time of the Spanish-American War. He entered the service of the American Steel & Wire Co. almost 30 years ago and, because of his more than 25 years service with the Steel Corporation, he had been granted the Gary medal. Major Holloway had been active for many years in the Kansas City Implement, Hardware and Tractor Club.

FRANCIS W. LANE, former editor of *Railway Age*, died Dec. 4, aged 72 years.

RANDOLPH ORTMAN, formerly president and later chairman of the board of the American Manganese Steel Co., died in the University Hospital at Charlottesville, Va., Dec. 8, aged 66 years. He was born in Vienna but received his schooling in the public schools of Saginaw and Detroit. From 1893 to 1915 he served as assistant treasurer of the Griffin Wheel Co. He had been president and then chairman of the Ramapo-Ajax Corp. and a director of the American Brake Shoe & Foundry Co. and of the American Forge Co.

SAMUEL FRANKLIN LONG, for the past five years associated with the

National Roll & Foundry Co., Avonmore, Pa., died at the Presbyterian Hospital, Pittsburgh, on Dec. 4. He was born in Pittsburgh 57 years ago and secured his early engineering training in the office of Julian Kennedy, Pittsburgh consulting engineer. Later he was identified for a time with the Mesta Machine Co. Before going with the National company in a roll sales capacity, he served for a time as president of the Ironclad Mfg. Co., Canton, Ohio.

J. EDWARD BULGER, before his retirement in 1924 superintendent of the Superior Steel Corp., Carnegie, Pa., died at his home in Pittsburgh on Dec. 4. He had become associated with the Superior company in 1892, and had continued in that connection until his retirement.

WALTER ROSS GRAVENER, Southeastern sales manager of the Amer-

ican Steel Foundries, Chicago, died on Nov. 21, aged 58 years. He became identified with the American Steel Castings Co. in 1900 and, when this was taken over by the American Steel Foundries in 1903, Mr. Gravener became associated with the new company as salesman in the New York office. He was made sales agent for the Southeastern territory in 1905 and sales manager in November, 1929.

CHARLES WILLIAM POTTS, of Horace T. Potts & Co., Philadelphia, died, Dec. 4, in the Gorgas General Hospital, Balboa, Canal Zone. He was 53 years of age and until recently had been head of the tool and alloy steel department of the company. Because of ill health, he was on an ocean voyage through the Panama Canal.

ANDERS JOHN ANDERSON, president, Forest City Bit & Tool Co., Rockford, Ill., died Nov. 30 at his home in Rockford after a brief illness. A native of Sweden, he came to this country as a youth and for six decades had lived in Rockford. He was 82 years old.

Criticisms Are Invited on Depreciation Study

WASHINGTON, Dec. 9.—Addressing a tax conference of the American Mining Congress last Friday, John T. Keenan, valuation engineer of the Internal Revenue Bureau, said that the sole desire of the bureau in conducting its depreciation study is to be helpful, to lessen the taxpayers' burden, rather than add to it. He told the conference that the bureau will welcome the benefit of the Congress' experience as well as information as to any material errors which may be found to exist in the preliminary report, which, it was stated, will be available shortly. Mr. Keenan declared that the rates of depreciation based on the probable useful lives set forth will not be prescribed in any case, and that employees of the bureau, as well as taxpayers, will be cautioned against using them arbitrarily. Any use that they may have, it was pointed out, will be solely as a guide or starting point from which the correct rates in any case may be predicated according to the facts and conditions peculiar to that case.

"When the Commissioner of Internal Revenue initiated the study of depreciation, it was his desire to obtain all the data relative to that subject that the industries of the country might submit—that they might be given an opportunity to present fully and clearly their views and their recommendations on depreciation rates, the effect of obsolescence, the method of charging replacement costs and other accounting practices, so that the representatives of the income tax unit and taxpayers might be better in-

formed through these recommendations, concerning depreciation accounting, to the end that the cost of plant and equipment used in doing each year's business might be determined with a fair degree of accuracy," said Mr. Keenan.

Cotton Tie Freight Rates Ordered Revised

WASHINGTON, Dec. 9.—The Interstate Commerce Commission last week announced a decision which calls for revised ratings on cotton bale covering and iron or steel ties and buckles in the South and Southwest. The revision was proposed by the railroads and was held by the commission to be justified. It will become effective Dec. 15. The revision involves a rate of 27.5 per cent of first class, minimum 30,000 lb., on mixed carloads of bale covering, ties and buckles. This cancels commodity rates and results in many reductions as well as increases. No change was made on ties or buckles in straight carloads, upon which commodity rates on iron and steel articles apply.

On less-than-carload quantities of bale covering and ties and buckles, the new rates are sixth class, or 40 per cent of first class, an increase of 33½ per cent. They also apply fifth class rates, or 45 per cent of first, in place of the eighth class rates on "baling or binding ties, iron or steel, band or wire, n. o. i. b. n." (not otherwise indexed by name), representing an increase of 50 per cent over the present eighth class rates. Ties of the latter kind are used for baling hay, but not for cotton.

Order Placed for 150 Presses

THE one bright spot in the machinery trade the past week was a \$500,000 order placed by the Kelsey-Hayes Wheel Co., Ltd., and the Briggs Body Corp., Ltd., of England for 150 presses for their plants adjoining the new Ford Motor Co. plant at Dagenham, England. The entire order went to the E. W. Bliss Co., Brooklyn, which will build the equipment in this country, although it has a plant in England. The equipment will be used for the manufacture of bodies, wheels

and other parts for Ford automobiles. Machine tool buying in general is at very low ebb, and it is doubted that the volume this month will exceed that of November and may, in fact, go lower. However, there is an accumulation of prospects that may result in orders after Jan. 1. Only a small improvement would be necessary to make January business larger than that of any of the previous three or four months.

Expectations are that there may be

General Machinery Business Slow But Prospects for January Improve

a fair amount of replacement buying during the first quarter of 1931. It is known that a good many companies have grasped the opportunity afforded by recent dullness to go over their machine tool equipment very carefully and throw out that which is obsolete or worn out. It has not been necessary in most instances to replace this equipment, but eventually the need will arise. Interest among manufacturers centers in new tools that will perform operations at lower unit costs.

New York

If a fair proportion of orders results from the tentative promises of machinery users that they will take action after the first of the year on prospective purchases, the volume of business in January and February should be somewhat better than that of the past few months. The machine tool trade does not lack prospects, but it is virtually impossible to obtain consideration of actual purchases at this time. An illustration of the fact that many companies do not want items of capital investment to appear on this year's books is afforded by an order given to a machine tool dealer which specified that shipment might be made at the tool builder's convenience, provided billing was dated not earlier than Jan. 1. Poor as the November business in machine tools was, it is likely that sales this month will be even smaller.

Pittsburgh

Occasional inquiries for immediate action are coming out, but sales are in light volume and confined principally to single tools. Dealers are doing considerable sales promotion work and find many prospective buyers ready to listen to possibilities of plant economies by means of equipment betterment. Securing appropriations for this work is not so easy.

Makers of rolling mill machinery and equipment are reaching the end of most of the large orders placed early in the year, but report considerable work in prospect to be announced early in 1931. Low prices and keen competition are forcing many steel companies to take all possible steps toward plant economy. While no substantial additions to capacity are in prospect, equipment replacement will likely be a big item next year.

New England

Some machine tool dealers who anticipated making sales this month with 1931 datings now state there is little likelihood of such transactions. Bids will close Dec. 16 on a boring mill and two shapers for the Boston Navy Yard. New England machine tool builders report a number of machines being figured on by automobile manufacturers. For the first time in many months textile machinery manufacturers are figuring on sizable amounts of equipment, and machine tool builders expect metal-working equipment will be required to complete such orders. There are other indications that the machine tool market will be more active during the first quarter of 1931.

Cleveland

An order for 150 presses aggregating about \$500,000 was placed in Detroit the past week for shipment to England for manufacturing automobile bodies, wheels and other parts for the British plant of the Ford Motor Co. The purchase was made by the Kelsey-Hayes Wheel Co., Ltd., and the Briggs Body Corp., Ltd., which operate branch plants of the Detroit companies bearing the same names. These British plants adjoin the Ford works at Dagenham. The entire order went to the E. W. Bliss Co. While this company has a plant in England, it is stated that all the presses will be built in the United States. The order includes 75 large presses, 20 of these of a very large size, and 75 in medium and small sizes.

Local machine tool dealers report a slight gain in orders and inquiries for one or two machines and there are indications that December sales will show a slight increase over those of November.

Milwaukee

Only pressing need for a new tool brings out any business above the surface of the current market, and an order for more than two units is rare. However, the aggregate volume suffices to make possible a partial maintenance of working forces in most machine tool plants. Business is running close to the November average, and the trade is hopeful that December volume will equal that of last month. Although no large increase in business is expected with the new year, there are indications that January will prove much better than any recent month. Inquiry is steadily growing and is of a more decisive character.

Cincinnati

A few single tool orders were received the past week, which were sufficient to sustain the present restricted rate of operations. Payrolls are being held to a minimum, but no change has been noted for the past month. Despite the present sluggishness of the market, manufacturers continue optimistic regarding prospects for the first quarter. In fact, the past two weeks has witnessed a slight revival of inquiry.

Chicago

Sales the past week have been extremely light and, although buyers in general are showing a little more interest, there appears to be little prospect that purchases will gain in the remaining three weeks of the year. The North American Car Corp. has purchased two lathes, a miller, shaper and a drill press, all used equipment. The Milwaukee Road will buy a metal bandsaw and the Burlington is inquiring for a 6-ft. radial drill. A local steel mill has

added two items to a list of rather long standing. Among the more important orders closed this week were a horizontal boring machine and two medium-sized lathes.

New York

CONSTRUCTION will soon begin by Siegel & Levy, 1775 Broadway, New York, architects, on a multi-story automobile service, repair and garage building at Webster Avenue and 176th Street, to cost close to \$100,000 with equipment.

Standard Oil Co. of New York, 26 Broadway, plans rebuilding part of storage and distributing plant at Brooklyn, known as Pratt Works, destroyed by fire Dec. 3, with loss over \$750,000 including battery of 19 steel tanks.

RKO Studios, Inc., 1560 Broadway, New York, is arranging for purchase of site at Hollywood, Los Angeles, for a new two-story film plant and laboratory, with capacity of about 5,000,000 ft. per month, to cost over \$750,000 with equipment.

Starman Syphon Mfg. Co., Brooklyn, has been organized with capital of \$50,000 to take over and expand company of same name, with plant at 196 Seigel Street, manufacturer of bottle siphons and kindred equipment.

Sinclair Refining Co., 45 Nassau Street, New York, has work under way on expansion and improvements at oil refinery at Sisco, Houston, Tex., to cost over \$4,000,000 with equipment.

Rubsam & Horrmann Brewing Co., 191 Canal Street, Stapleton, S. I., has plans for a multi-story ice-manufacturing plant

and beverage plant adjoining, to replace units recently destroyed by fire, to cost over \$350,000 with equipment.

General Electric Co., Schenectady, N. Y., has plans for one and two-story addition, 320 x 370 ft., to plant at Cleveland, to cost over \$450,000 with equipment. A one-story power house, 60 x 80 ft., will also be built.

G. B. Seely's Son, Inc., 319 West Fifteenth Street, New York, manufacturer of carbonated beverages, has leased new multi-story building to be erected at 630 West Fifty-fifth Street, for which general contract was recently let to G. Richard Davis, 12 East Forty-first Street, for a new bottling, storage and distributing plant, to cost over \$400,000. Present works will be removed to new location.

Motoramp Garages of New Jersey, Inc., care of James V. Coyle, 250 Park Avenue, New York, engineer, president, has purchased property at Jersey City, N. J., as site for new eight-story automobile service, repair and garage building, to cost over \$400,000 with equipment. Plans will be drawn at engineering offices of Mr. Coyle.

Board of Education, Washington, N. J., contemplates installation of manual training equipment in new two-story and basement high school to cost about \$160,000, for which plans will be drawn by Charles Granville Jones, 280 Broadway, New York, architect.

Standard Oil Co. of New Jersey, 185 Washington Street, Newark, has asked bids on general contract for a one and two-story hangar at Newark Airport, with reconditioning and repair facilities, to cost more than \$30,000 with equipment.

Dorsey Motors, Inc., Fayette and Maple Streets, Perth Amboy, N. J., representa-

tive for Ford automobiles, has acquired former local plant of Kimberly Phonograph Co., and will remodel for new service, repair and sales building.

John C. Kohaut, Inc., 117 Green Street, Newark, operating a wood-working and cabinet plant, has rejected bids for a new three-story and basement plant, 50 x 100 ft., and will take new bids on general contract later to cost about \$40,000 with equipment. Marshall N. Shoemaker, 10 Bleecker Street, is architect and engineer.

Mallinckrodt Chemical Works, Inc., West Side Avenue, Jersey City, N. J., manufacturer of industrial chemicals, has asked bids on general contract for a two-story addition, 72 x 152 ft., to cost about \$50,000 with equipment. H. W. Andrews, 15 East Fortieth Street, New York, is engineer.

National Sheet Metal Roofing Co., 339 Grand Street, Jersey City, N. J., has leased one-story buildings at 715 Spring Street, Elizabeth, N. J., and will remodel for new plant.

G. & B. Marine Repair Co., Inc., Hoboken, N. J., has leased one-story building at 125 Garden Street, for local works.

Davies & Thomas Co., manufacturer of gray iron and semi-steel castings, is moving its New York office from 342 Madison Avenue to Lincoln Building.

Hudson Smelting & Refining Co., Newark, N. J., has purchased an interest in Industrial Metal Co., Inc. Latter company will be incorporated under laws of New Jersey, and its activities will be concentrated at Newark, where contracts have been let for additional buildings. Hudson Smelting & Refining Co. has also let contracts for two new furnace units. Official personnel of Industrial Metal Co., Inc., will be: I. W. Wlenczuk, president

INDUSTRIAL ACTIVITY

Week's Total Projected Construction Reaches \$38,250,000 with Public Utility Programs Contributing \$20,500,000

TOTAL new construction requiring machinery and other equipment reported for the week is \$38,250,000, compared with \$21,750,000 a week ago and \$38,000,000 two weeks ago. Note issues by utility companies in Chicago and Toledo total \$43,000,000.

The greater part of this week's total, about \$20,500,000, is contributed by public utilities, which have substantial programs of construction for 1931. The Detroit Edison Co. will expend \$13,000,000 during the year and the Edison Electric Illuminating Co., Boston, \$1,000,000. The San Joaquin Light & Power Co., Fresno, Cal., plans a \$540,000 substation at Herndon, Cal., and an \$870,000 new transmission line.

Oil company construction is a factor this week, with more than \$5,000,000 to be spent for expansion at Kansas City, Mo., by the Phillips Petroleum Co.; in Brooklyn, by the Standard Oil Co.; at Sisco, Tex., by the Sinclair Refining Co., and at Bristow, Okla., by the Marathon Oil Co.

Industrial construction totals close to \$9,500,000,

of which building by metal-working plants is in excess of \$2,000,000. Among the larger projects announced are \$700,000 for a power plant at Augusta, Ga., for the Augusta Canal Co.; \$500,000 for an addition to the assembly plant of the Ford Motor Co., at Long Beach, Cal.; \$450,000 for a wood pulp plant at Longview, Wash.; \$750,000 for a film laboratory at Hollywood, Cal.; \$350,000 for a power plant for a paper company at Port Huron, Mich., and \$125,000 to rebuild a mill of the Blair Strip Steel Co., New Castle, Pa. Ice and refrigerating plants reach a fair total this week with close to \$750,000 for plants at Donora, Pa.; Stapleton, N. Y.; Asheville, N. C., and Rota, Tex.

Municipal construction of \$2,000,000 includes a \$1,000,000 waterworks at Houston, Tex., a \$400,000 electric plant at Yoakum, Tex., and a \$250,000 sewage disposal plant at Milwaukee.

Vocational school construction is small at \$1,500,000, compared with \$3,000,000 announced a week ago. New construction is planned at Manitowoc and Superior, Wis.; Washington, N. J.; Cleveland and Bellefontaine, Ohio.

and general manager; J. W. Paterson, vice-president and treasurer; G. E. Friedel, secretary.

Botwinik Brothers, Inc., New Haven, Conn., has opened a branch store at 249 Centre Street, New York, and will deal in a full line of machine tools. A. A. Johnson is in charge.

Buffalo

WORK will begin in January by Oswego Harbor Co., Oswego, N. Y., on new grain elevator, with elevating, conveying, screening and other equipment, to cost over \$300,000. Company proposes construction of large flour mill on adjoining site, upon completion of elevator unit.

Robert and J. Edwards, 307 Hawley Avenue, Syracuse, N. Y., have organized Cole-Ward, Inc., and plan operation of local factory for production of vending machines, including parts production and assembling.

Armstrong Chemical Co., Inc., 133½ West Manlius Street, East Syracuse, N. Y., manufacturer of industrial chemicals, has acquired plant of Canandaigua Brewing Co., Canandaigua, N. Y., and will remodel for new plant. Present factory will be removed to new location.

Hinde & Dauch Paper Co., Decatur Street, Sandusky, Ohio, manufacturer of fiberboard boxes and containers, has arranged for purchase of Buffalo Box Factory, Inc., 30 Scoville Avenue, Buffalo, manufacturer of kindred products, and will consolidate. Purchased plant will be continued under same management, with James B. Fenton, heretofore president, in charge.

Niagara, Lockport & Ontario Power Co., Electric Building, Buffalo, has purchased property of Clymer Power Co., at Clymer, N. Y., and will consolidate. Plans are under way for expansion in last-mentioned district, including transmission line from Sherman to that vicinity.

Sterling Range & Furnace Corp., Rochester, N. Y., and Fuller & Warren Co., Troy, N. Y., will be merged, effective Jan. 1. Equipment of Fuller & Warren Co. will be moved to Rochester, where operations will be concentrated. New company will be incorporated as Sterling-Stewart Corp.

Philadelphia

PLANS are under way by Westinghouse Electric & Mfg. Co., East Pittsburgh, for extensions and improvements in South Philadelphia works. Part of manufacturing space will be converted into new locomotive shop for equipping and testing Westinghouse electric and oil-electric units; such production will be concentrated here in future and present works removed from East Pittsburgh. Other part of program will provide for branches of production for steam power equipment for large generating plants and marine equipment, comprising main production of plant. Work will cost about \$300,000.

John Crompton Adelphia Corp., 145 West Columbia Avenue, Philadelphia, manufacturer of paper boxes and containers, has awarded general contract to Haverstick-Borthwick Co., 1505 Race Street, for new plant, to cost about \$50,000 with equipment. J. Fletcher Street, 1120 Locust Street, is architect.

Sun Oil Co., 1608 Walnut Street, Philadelphia, has awarded contracts to Hughes-Foulkrod Co., Schaff Building,

for new bulk oil storage and distributing plants at Altoona and Brownsville, Pa., including automobile service and repair units and garages, to cost close to \$50,000 with equipment.

Officials of Campbell Soup Co., Camden, N. J., have organized Canadian subsidiary under name of Campbell Soup Co., Ltd., with capital of \$2,000,000, to erect a canning plant. About 15 acres has been purchased at New Toronto, Ont., and plans for initial unit will begin soon, to cost over \$750,000 with machinery. Company offices will be established at Toronto.

Atlantic City Electric Co., Atlantic City, N. J., has purchased municipal electric light and power plant at Beach Haven, N. J., for price of \$151,000, and will develop for central station service. Expansion is planned, including transmission lines.

Lewis Campbell, Jr., Boyertown, Pa., and associates have organized Lewis Campbell, Jr., Inc., with capital of \$75,000, to operate a local iron and steel works, including department for brass and copper specialties, pipe fittings, etc.

Warner Co., foot of Market Street, Wilmington, Del., operating sand and gravel properties, mixed concrete plants, etc., is arranging for expansion and improvements to cost about \$900,000, including equipment, storage and distributing plants in Wilmington and Philadelphia districts and other terminals. Company engineering department is in charge.

Edison Light & Power Co., 27 West Market Street, York, Pa., and York Railways Co., same address, associated interests, are planning expansion and betterments in electric light and power properties, including extensions in power plants, transmission and distributing lines, to cost over \$600,000. J. E. Wayne is vice-president and general manager.

South Atlantic

FORMER plant of M. P. Moller Motor Co., Hagerstown, Md., has been taken over by Martin Motors, Inc., Washington, and will be remodeled for assembling plant for new Martin automobile, to be smallest car yet produced in this country with wheel base of less than 72 in. Plant will be developed for initial output of about 20,000 complete cars monthly. James W. Bryan is president.

Pearce-Young-Angel Co., 109 Roberts Street, Asheville, N. C., has plans for an addition to ice-manufacturing and refrigerating plant, to cost about \$70,000 with equipment.

Charlotte Pipe & Foundry Co., Commercial Building, Charlotte, N. C., has awarded general contract to McClelland Co., Latta Arcade Building, for rebuilding one-story foundry, with increased space over former plant, to cost close to \$100,000 with equipment.

Bureau of Yards and Docks, Navy Department, Washington, will receive bids until Dec. 17 for two 1000-hp. boilers and accessories for local navy yard.

Scripto Mfg. Co., 114 Jackson Street, N.E., Atlanta, Ga., manufacturer of pencils, etc., has awarded general contract to F. E. Varner & Co., Atlanta, for new one-story plant, totaling about 45,000 sq. ft. floor space, to cost over \$150,000 with equipment. J. M. Russell, Standard Building, is architect; G. G. Scofield, Ponce de Leon Court, is consulting engineer.

Town Council, Brunswick, Md., is considering extensions and improvements in

municipal waterworks, including long-distance pipe line construction, to cost close to \$75,000.

Board of District Commissioners, District Building, Washington, is asking bids until Dec. 18 for one electric-operated metal shear, one boring mill, one metal-cutting machine, two lathes, one grinder, one rivet machine, one surfacer, one swing cut-off saw, one jointing machine, one tilting table saw, one drill grinder, two drill presses, one bandsaw machine, one shaper, one bolt-threading machine, two horizontal air compressors, and one air receiver; until Dec. 19 for six horizontal steel tanks for oil storage, 12,000-gal. capacity.

Virginia Wood Preserving Corp., Tenth and Water Streets, S.W., Washington, Aubrey L. Clark, head, has acquired 40 acres near Richmond, Va., and contemplates new plant, to include steel drums and tanks, pipe lines, spraying equipment, railroad line, etc., to cost over \$250,000.

Coca-Cola Bottling Co., Atlanta, Ga., will soon begin erection of one and two-story and basement bottling plant at Cuthbert, Ga., with automatic bottling machinery and handling equipment, to cost \$50,000. Dennis & Dennis, 556 Mulberry Street, Macon, Ga., are architects.

Augusta Canal Co., Augusta, Ga., has plans for a new power house to cost over \$700,000 with equipment and transmission lines. Burns & McDonnell Engineering Co., Interstate Building, Kansas City, Mo., is consulting engineer.

Mallory Machinery Corp., 522 Light Street, Baltimore, is in market for a direct fired dryer, 5 x 30 ft., shell of which must be sufficiently thick to stand 1800 deg. Fahr.

New England

PLANS are under way by Edison Electric Illuminating Co., 39 Boylston Street, Boston, for addition to central steam power plant, to cost \$1,000,000 with equipment. About \$250,000 of this amount will be used for pipe line construction for central heating service in different commercial buildings. Company engineering department is in charge.

Aviation Committee of Chamber of Commerce, Hartford, Conn., is planning new hangar with repair facilities at Brainard Field, to cost over \$25,000 with equipment. Capt. Clarence M. Knox is advisory engineer for City Aviation Commission.

Universal Winding Co., Auburn, R. I., manufacturer of textile machinery and parts, has awarded general contract to A. F. Smiley Construction Co., 210 Main Street, Pawtucket, R. I., for two-story addition, to cost over \$40,000 with equipment.

Batchelder Mfg. Co., Boston, care of Harold K. Osgood, 85 Devonshire Street, treasurer, recently formed by Mr. Osgood and associates with capital of \$50,000, plans operation of local factory for manufacture of special machinery and mechanical equipment. James W. Batchelder is president.

New England Terminal Co., Providence, R. I., affiliated with Pennsylvania Petroleum Products Co., same city, has plans for a bulk oil terminal and distributing plant at Tiverton, R. I., where waterfront property has been secured. Plant will have initial capacity of 200,000 bbl. of oil, gasoline, etc., and will cost over \$80,000 with equipment. James B. Berry Sons Oil Co., Oil City, Pa., is inter-

ested in project and has substantial interest in New England Terminal Co.

Bay State Abrasive Products Co., Westboro, Mass., has been organized with capital of \$150,000, to take over and expand local company of same name, manufacturer of grinding wheels and other abrasive specialties. Orello S. Buckner is president, and Leonard M. Krull, treasurer.

Bristol Co., Waterbury, Conn., manufacturer of recording instruments, parts, etc., has plans for extensions and improvements in factory at Platts Mills, to cost over \$45,000 with equipment. E. A. Webster, 51 West Main Street, Waterbury, is architect.

L. E. McLaughlin, Inc., 217 Jefferson Avenue, New London, has started work on a shop, 50 x 150 ft.

Cape & Vineyard Electric Co., Martha's Vineyard, Mass., has plans for a power house addition.

Parker Clock Co., West Main Street, Meriden, Conn., has started work on a new one-story plant.

City of Worcester, Mass., closed bids Dec. 9 on a one-story, pumping station, 31 x 44 ft., for which miscellaneous electrical equipment will be purchased. City has approved a recommendation to purchase property on which a trade school will be built.

Plans have been completed for a one-story factory, 85 x 120 ft., to cost \$20,000 without equipment, for Springfield Wire & Tinsel Co., West Springfield, Mass.

Chicago

FOLLOWING recent organization, National Pfanstiehl Radio Co., Waukegan, Ill., has leased about 10,000 sq. ft. floor space in Garrett Wilson Building, Genesee Street, for new plant for manufacture of radio sets and equipment.

Peoples Gas Light & Coke Co., 122 South Michigan Boulevard, Chicago, operating artificial gas properties, has arranged for a note issue of \$8,000,000, part of proceeds to be used for expansion in plants and system.

Rowe Mfg. Co., Galesburg, Ill., manufacturer of ladders, gates, log oilers and other mechanical equipment, plans rebuilding part of plant destroyed by fire Dec. 2, with loss over \$60,000 including equipment.

Minneapolis Gas Light Co., 800 Hennepin Avenue, Minneapolis, operating artificial gas properties, has taken out a permit for a three-story and basement equipment service, repair, storage and distributing plant, to cost \$200,000 with equipment. Ekman, Holm & Co., Phoenix Building, are architects.

Minnesota Valley Canning Co., Le Sueur, Minn., has plans for an addition to local plant, to cost about \$40,000 with equipment. Company also plans extensions to branch plant at Winthrop, Minn., to cost close to like sum. Ralph W. Richardson, 116 East Fourth Street, St. Paul, Minn., is architect and engineer.

Indian Refining Co., Lawrenceville, Ill., is planning to rebuild part of local oil refinery recently destroyed by fire with loss close to \$30,000 including equipment.

Steel Wire & Band Products Co., Chicago, care of John C. Melaniphy, 139 North Clark Street, Chicago, recently organized, plans operation of local factory for manufacture of wire goods, etc. Carl F. Wendrick, Jr., and Morris Gelman are principal incorporators.

City Council, Grundy Center, Iowa, has

plans for a municipal electric light and power plant to cost \$80,000. Bond issue has been approved.

Great Northern Railway Co., Railroad Building, St. Paul, Minn., will take bids in about 60 days for one-story power plant at Great Falls, Mont., to cost close to \$75,000 with equipment. About same time bids will be asked for similar plant at Whitefish, Mont. T. D. McMahon, address noted, is company engineer.

Public Service Co. of Colorado, Denver, is planning expansion and improvements during 1931 to cost about \$4,000,000, including extension in steam-operated electric generating plant at Valmont to cost close to \$2,000,000 with machinery, and additions in steam-operated and hydroelectric power stations at Alamosa, Grand Junction, Sterling and other points, to cost about \$500,000. Company engineering department is in charge.

Detroit

PLANS are under way by Department of Street Railways, Administration Building, Shoemaker and St. Jean Streets, Detroit, for one-story service and repair shop for electric coaches.

Ford Motor Co., Dearborn, is considering one-story addition to branch assembling plant at Long Beach, Cal., to cost over \$500,000 with equipment. Albert Kahn, Inc., Marquette Building, Detroit, is architect and engineer.

Holt Mica Spark Plug Co., Holt, Mich., recently organized, has plans for a one-story factory, to cost close to \$40,000 with machinery.

Sparks-Withington Co., Jackson, Mich., manufacturer of automotive products, radio equipment, etc., has awarded general contract to North-Moeller Construction Co., Jackson, for one-story addition, including alterations and improvements in present plant, to cost about \$65,000 with equipment. Lockwood Greene Engineers, Inc., Hanna Building, Cleveland, is architect and engineer.

Detroit Edison Co., 2000 Second Avenue, Detroit, is arranging for expansion and improvements during 1931 to cost about \$13,000,000, including extensions in power plants, transmission and distributing lines, substations, service units, etc. Company engineering department will be in charge. A. C. Marshall is vice-president and general manager.

Stark Pump & Stoker Co., Highland Park, Detroit, has been organized with capital of \$50,000 to take over and expand Stark Pump Co., 17128 Mount Elliott Avenue. Lewis D. Stark, Ferndale, Mich., and Herbert S. Moore, Toronto, Ont., are principal incorporators.

Port Huron Sulphite & Paper Co., Port Huron, Mich., is planning construction of new power plant, to cost over \$350,000 with equipment.

Board of Wayne County Road Commissioners, Court House, Detroit, has approved plans for a one-story machine and repair shop, 60 x 100 ft., to cost about \$35,000 with equipment. County engineering department is in charge.

Lewis-Clark Radio Laboratories, recently formed by Fred H. Lewis, Ann Arbor, Mich., and associates, has taken over factory of Chelsea Rubber Co., Chelsea, Mich., for a new plant for manufacture of radio equipment and parts. It is proposed to begin production soon. Clyde Clark, Jackson, Mich., will be an official of new company.

City Commission, Bay City, Mich., is considering installation of a municipal

electric light and power plant, to cost over \$100,000 with equipment.

Lisk Machine & Tool Works, Inc., Detroit, recently organized, will take over and succeed to company of same name, with plant at 4129 West Jefferson Avenue. George A. Lisk and William J. May are heads.

Gulf States

PLANS are under way by City Council, Yoakum, Tex., for a municipal electric light and power plant and waterworks, to cost over \$400,000 with machinery. Montgomery & Ward, Harvey-Snider Building, Wichita Falls, Tex., are consulting engineers.

City Council, Galveston, Tex., has plans for a municipal airport, including hangars, repair shop and other field units, to cost over \$80,000 with equipment. Beetta-Stiles Co., National Bank of Commerce Building, San Antonio, Tex., is engineer.

Circle Bar Cattle & Packing Co., Rotan, Tex., recently organized with a capital of \$3,000,000, more than \$1,000,000 of which has been paid in, is considering early establishment of meat-packing and refrigerating plant, including cannery facilities, to cost over \$150,000 with equipment. W. W. Barron is president, and G. L. Robinson, vice-president.

Saline Chemical Co., Houston, Tex., recently organized, has taken out a State charter; H. B. Anderson, 1814 Stanford Street, is company representative. Plans are under way for new works for manufacture of industrial chemicals at Pierce Junction, near Houston, where salt properties have been secured, to cost over \$500,000 with machinery.

Sterling Railway Specialties Co., Inc., Jacksonville, Fla., recently organized with capital of \$225,000 by J. H. Rice, 728 Gilmore Street, and associates, plans operation of local works for production of iron and steel products for railroads.

Dallas Power & Light Co., Dallas, Tex., has acquired over 1100 acres in Mountain Creek district to be used in connection with new hydroelectric generating plant on Mountain Creek Lake, for which work has been authorized. Plant will have ultimate capacity of 120,000 kw., and will cost over \$5,000,000. Company engineering department is in charge.

Board of Public Works, Houston, Tex., has plans for extensions and improvements in municipal waterworks, including installation of pumping machinery, power equipment, pipe lines, etc., to cost over \$1,000,000. James H. B. House is chairman of board of water commissioners. J. A. Sauls is city water engineer.

Texas-Louisiana Power Co., Electric Building, Fort Worth, Tex., is planning expansion and improvements in electric light and power properties at Ranger, Breckenridge and vicinity, including transmission and switching station construction, to cost over \$150,000. Company engineering department is in charge.

Common Council, Crowley, La., is considering installation of a municipal electric light and power plant, to cost over \$65,000 with equipment.

Park and Recreation Board, Birmingham, will open bids Dec. 22 for new hangar, and new terminal building at municipal airport, hangar to be 120 x 150 ft. with lean-to 24 x 150 ft. Terminal building will be two stories, 79 x 135 ft. E. W. Stanford, Martin Building, is architect.

Cleveland

AN expansion program has been authorized by Goodyear Tire & Rubber Co., Akron, Ohio, at branch mill at Gadsden, Ala., to increase capacity from 5000 to 6000 tires daily. Additional output will also be arranged for tubes.

American Railway Signal Co., Fostoria, Ohio, has awarded general contract to Howard Kime & Son, Fostoria, for rebuilding part of plant recently destroyed by fire, to cost over \$35,000 with equipment.

Bryant Heater & Mfg. Co., 17825 St. Clair Avenue, Cleveland, manufacturer of gas heaters, parts, etc., has plans for an addition to cost over \$150,000 with equipment. Fox, Duthie & Foose, Union Trust Building, are architects.

Salineville Brick & Tile Co., Salineville, Ohio, recently organized, has acquired former local plant of Continental Clay Co., and will remodel for manufacture of brick, hollow tile and other heavy clay products, to cost over \$65,000 with machinery.

Toledo Light & Power Co., Toledo, Ohio, now arranging for change of name from Toledo Traction, Light & Power Co., is disposing of a note issue of \$35,000,000, part of proceeds to be used for extensions and improvements in electric light and power properties, including transmission lines.

Board of Education, Standard Trust Bank Building, Cleveland, plans installation of manual training equipment in new three-story John Marshall High School, to cost close to \$850,000, for which general contract has been let to Crowell & Little, Hanna Building. George Hopkinson, Auditorium Garage Building, is architect.

Collingwood Brick Co., Stickney Avenue, Toledo, Ohio, has approved plans for a new brick and heavy clay products manufacturing plant, to cost over \$100,000 with machinery. Contract for superstructure for several one-story units will be let to Mark Tatter, 1435 West Woodruff Avenue.

Cleveland Steel Specialty Corp. has removed its office and plant to a new building at 3765 East Ninety-first Street, Cleveland.

Surface Combustion Co., Toledo, has purchased gas equipment division, including foundry, of Columbus Heating & Ventilating Co., Columbus, Ohio, manufacturer of gas-fired warm air furnaces and unit heaters. For present manufacturing of this line will be continued at Columbus.

Pittsburgh

CONTRACT has been let by National Transit Pump & Machine Co., Oil City, Pa., a subsidiary of National Transit Co., to L. O. Bouquin Co., Oil City, for seven one-story shops, to cost over \$400,000 with machinery. Pittsburgh offices are in Farmers' Bank Building.

Western Ice & Utilities Co., Des Moines, Iowa, is planning expansion and improvements in ice-manufacturing and refrigerating plants at Donora, Pa., and other points in Monongahela River valley, including additional equipment, to cost about \$160,000.

Westinghouse Electric & Mfg. Co., East Pittsburgh, has awarded general contract to Cahill Brothers, 206 Sansome Street, San Francisco, for a one-story addition to branch plant at Emeryville, Cal., to cost close to \$50,000 including equipment.

Clark Miller, 5023 Frew Avenue, Pittsburgh, and associates have organized Standard Steel Fabricating Co. to operate a local works, including division for production of machine products and castings. Mr. Miller will be treasurer. Charles F. Patterson, Backbone Road, Sewickley, Pa., is one of heads of new company.

Blair Strip Steel Co., New Castle, Pa., has awarded general contract to A. W. Bauman, 306 East Winter Street, for one-story works, 50 x 250 ft., to replace part of plant recently destroyed by fire, to cost over \$125,000 with equipment.

Standard Oil Co. of New Jersey, Charleston, W. Va., has awarded general contract to A. G. Higginbotham, Charleston, for a one-story automobile service, repair and garage building, 120 x 130 ft., to cost about \$75,000 with equipment. Headquarters are at 26 Broadway, New York.

St. Louis

BIDS have been asked on general contract by Acme Furnace & Sheet Metal Co., 407 Southwest Boulevard, Kansas City, Mo., for one-story addition, 50 x 100 ft., to cost about \$25,000 with equipment. H. D. Pampel, Finance Building, is architect.

A. E. Smith, 1207 Grand Street, Kansas City, Mo., and associates have organized Automatic Safety Bumper Co., with capital of \$100,000 and will operate local plant for manufacture of special automobile bumpers.

Marathon Oil Co., Bristow, Okla., has plans for extensions and improvements in local oil refinery with additional equipment for processing for gasoline and kerosene production, as well as machinery for lubricating oil manufacture, to cost over \$150,000. Headquarters are at Findlay, Ohio. W. W. Fleming is president.

Fort Smith Body Co., 512 South Ninth Street, Fort Smith, Ark., manufacturer of automobile bodies, plans early erection of one-story addition, to cost \$30,000 with equipment. Bassham & Wheeler, Kennedy Building, are architects.

Board of Public Service, St. Louis, has asked bids on general contract for a one-story hangar, 90 x 120 ft., with lean-to extension on each side, 16 x 120 ft., at municipal airport, Natural Bridge and Bridgeton Station Roads, including repair facilities, to cost over \$75,000. Albert Oshburg, City Hall, is architect; L. R. Bowen, Department of Buildings and Bridges, City Hall, is chief engineer.

Union Pacific Railroad, Fifteenth and Dodge Streets, Omaha, Neb., has awarded general contract to Klewits Sons, Inc., Omaha National Bank Building, for two-story and basement motor bus repair and service shop, garage and depot, 160 x 300 ft., to cost over \$125,000 with equipment.

International Harvester Co., 606 South Michigan Avenue, Chicago, has awarded general contract to W. J. Assenmacher, 625 North Seventeenth Street, Lincoln, Neb., for one-story factory branch, storage and distributing plant, 110 x 450 ft., for motor truck division at Lincoln, to cost about \$125,000 with equipment. W. D. Price, Chicago headquarters, is superintendent of construction.

Phillips Pipe Line Co., an interest of Phillips Petroleum Co., Bartlesville, Okla., has purchased 114 acres in Fairfax industrial district, Kansas City, Kan., for new oil pipe line terminal, storage and distributing plant, to cost over \$350,000 with equipment. Engineering department of parent company will be in charge.

Prose-Macho Mfg. Co., Kansas City,

Mo., has taken over two-story factory at 1520 Holmes Street, for new plant for manufacture of school equipment.

J. M. Shea and B. M. Brownell, formerly associated with H. B. Wilson Co., St. Louis, have organized Shea-Brownell Co., with offices in Syndicate Trust Building, St. Louis, to deal in railroad and industrial equipment. New company is agent for Mahr Mfg. Co., Minneapolis; Morton Mfg. Co., Chicago; Lewis Bolt & Nut Co., Minneapolis; Cleveland Crane & Engineering Co., Wickliffe, Ohio; Geo. P. Reintjes Co., Kansas City, Mo.

Indiana

PLANS are being considered by South Bend Current Controller Co., South Bend, manufacturer of electrical equipment, control apparatus, etc., for a one-story addition, to cost over \$40,000 with machinery.

City Council, Goshen, has awarded contract for building to house municipal electric light and power plant to Rieth Riley Construction Co., Goshen, at \$27,464, and structure is scheduled for completion early next year. Equipment will cost about \$250,000.

Polar Ice & Fuel Co., 2000 Northwestern Avenue, Indianapolis, has acquired plant of Merchants' Ice Co., Sixteenth Street and Big Four Railroad, and will operate as one of chain of manufacturing plants in city. Plans are under way for extensions with installation to include new power ice conveyors, purifying equipment, pumping and other machinery.

Freyn Vacuum Force Cup Co., Inc., 1027 Architects' and Builders' Building, Indianapolis, recently organized, will operate a local plant for manufacture of new line of plumbing specialties, including a vacuum force cup, waste pipe cleaning unit, etc.

Walter Bates Steel Corp., Gary, operating a steel fabricating plant, has changed its name to Gary Structural Steel Co.

Cincinnati

BIDS have been asked on general contract by Jeffrey Mfg. Co., East First Avenue, Columbus, Ohio, manufacturer of conveying, elevating, pulverizing, screening and other machinery and parts, for a two-story shop addition, 93 x 147 ft., to cost over \$65,000 with equipment. Company engineering department is in charge.

Railway Supply Co., 1234 Harrison Avenue, Cincinnati, has awarded a general building contract to Midland Building Co., 2513 Burnet Avenue, for remodeling factory unit. Fechheimer & Thorst, Provident Bank Building, are architects. Carl J. Kiefer, Schmidt Building, is mechanical engineer.

Coca-Cola Bottling Works, 1527 Church Street, Nashville, Tenn., has rejected bids recently received for two-story plant at Lebanon, Tenn., to cost about \$50,000 with equipment, and will have revised plans drawn at once.

Garber & Woodward, 616 Walnut Street, Cincinnati, architects, have awarded general contract to Midland Building Co., 2513 Burnet Avenue, for one-story automobile service, repair and garage building, to cost close to \$150,000 with equipment.

Contracting Officer, Wright Field, Dayton, Ohio, will receive bids until Dec. 15 for three platform scales and 31 chain

hoists, each of 1 ton capacity; until Dec. 16, for altimeter assemblies in lots of 100 to 400, and 300 to 700; for airspeed indicator assemblies in lots of 100 to 400, and 300 to 700; until Dec. 17, for six propeller hub assemblies; until Dec. 16, for 170 gage auxiliary fuel tank tube assemblies, 170 gage auxiliary fuel tank washers, and 400 clamp brake pedal stops.

Board of Education, Bellefontaine, Ohio, plans installation of manual training equipment in new high school to cost \$200,000, for which a bond issue has been authorized. Walker & Norwick, American Building, Dayton, Ohio, are architects and expect to ask bids on general contract early in January.

Tway Mining Co., Harlan, Ky., plans rebuilding tipple at coal-mining properties about five miles from city, recently destroyed by fire, with loss of about \$70,000 including equipment.

Pacific Coast

PLANS are under way by Pacific Gas & Electric Co., 245 Market Street, San Francisco, for an equipment storage, distributing and service plant at San Mateo, Cal., to cost about \$65,000 with equipment. Company engineering department in charge.

Olive Heights Citrus Fruit Association, Olive, Cal., is planning construction of new precooling plant, to cost about \$75,000 with refrigerating and other machinery. Organization is planning increase in capital from \$75,000 to \$150,000 to provide funds. Benjamin Cole is general manager.

Peterson Showcase & Fixture Co., 5700 South San Pedro Street, Los Angeles, has filed plans for a second story addition to plant, 44 x 127 ft., including improvements in present factory. Frank L. Stiff, Detwiler Building, is architect.

San Joaquin Light & Power Corp., Fresno, Cal., has authorized construction of a new switching and power substation at Herndon, Cal., to cost \$540,000 with equipment, for service at new steam-operated electric power plant at last-noted place, for which plans were recently approved, to cost close to \$4,600,000. Plans are under way for a steel tower transmission line in Fresno district to cost \$870,000. Other expansion will be carried out in same section during next 12 to 15 months, entire development to cost \$7,390,000, including sums noted. Company engineering department will be in charge.

Minneapolis-Moline Power Equipment Co., Minneapolis, manufacturer of heavy machinery, parts, etc., has awarded general contract to William P. Neil Co., 4814 Loma Vista Street, Los Angeles, for one-story factory branch, storage and distributing plant, 81 x 135 ft., at Los Angeles, to cost about \$40,000 with equipment.

Carson & Schanck, Inc., Bellingham, Wash., has awarded a general contract to A. P. Jensen, 1624 Humboldt Street, for a one-story machine shop, to cost about \$18,000 with equipment.

Pacific Iron & Metal Co., 2213 First Street, South, Seattle, has taken bids on general contract through Robert E. Barrett, Pittock Block, Portland, architect, for two-story plant, 100 x 200 ft., to be occupied under lease for a new storage and distributing plant, with shop facilities, to cost \$100,000 with equipment. S. Murray, Pittock Block, Portland, is engineer.

City Council, Mount Pleasant, Utah, will soon take bids on general contract for municipal electric light and power

plant, to cost over \$75,000 with equipment. Caldwell & Richards, Templeton Building, Salt Lake City, Utah, are consulting engineers.

Weyerhaeuser Timber Co., Longview, Wash., has awarded general contract to Christopher Kuppler Sons, Port Angeles, Wash., for new pulp mill, to cost over \$450,000 with equipment.

Western Steel & Equipment Corp., Portland, Ore., has moved into its new offices and warehouse at 94 First Street.

Milwaukee

WORK has been started by Aluminum Specialty Co., Manitowoc, Wis., on two shop extensions with aggregate floor space of 7200 sq. ft., and inquiry is being made for stamping and drawing equipment for increased production of household utensils and laboratory specialties. Investment will be about \$45,000.

Finkler Motor Co., 901 Third Street, Milwaukee, has placed contracts for one-story addition, 80 x 90 ft., as extension of service floor and shop.

Board of Vocational Education, Manitowoc, Wis., has engaged William J. Raeuber, local architect, Manitowoc Savings Bank Building, to design new vocational school, for which bond issue of \$200,000 has been authorized. It is planned to begin work early in 1931.

Beaver Sheet Metal Works, Beaver Dam, Wis., is moving its shop and office to Spars Building, 307 South Spring Street, enlarging its capacity more than 100 per cent. A. A. Parker and A. E. Nightingale are owners of business.

Board of Vocational Education, Superior, Wis., is about to select an architect to draw plans for first unit of new vocational training group, one story, 100 x 200 ft., devoted exclusively to shop purposes. A two-story academic building will be added later. Initial work will cost about \$100,000.

Milwaukee County Board of Supervisors has rejected bids for construction of No. 3 hangar at County Airport and is calling for new bids, closing Dec. 18, on revised plan for structure, 100 ft. sq. and 22 ft. high. Estimated cost is \$50,000. William J. Cary is County clerk.

Badger Meter Mfg. Co., 841 Thirtieth Street, Milwaukee, has contracted with city of Madison, Wis., to furnish 3000 water meters on five-year deferred payment plan without interest, to maintain working force into new year without interruption.

Milwaukee Sewerage Commission, Jones Island, Milwaukee, is asking bids until Dec. 19 on a complete conveyor system for handling wet and dried sewage and coal in \$250,000 extension to drier house now under construction. Alternate bids will be received on spur gear or herringbone gear speed reducers. Lydia Bauer is secretary.

Canada

BIDS are being received by B. S. Wemp, chairman of Board of Control, Toronto, for two 50-hp. motors and control equipment.

Saw and planing mills at Brookfield, N. S., owned by Higgins Brothers & Co., were recently destroyed by fire. Owners will rebuild and are interested in equipment.

Dennis Steel, Ltd., 22 Dundas Street, London, Ont., contemplates erection of a one-story addition, 100 x 100 ft., work to be started in spring.

Dechaux Brothers, 2142 Beaudry Street, Montreal, are considering erection of a plant addition.

Contracts have been awarded for an addition to factory for Jem Rubber Co., Ltd., 3723 Dundas Street West, Toronto, to cost \$18,000. J. S. Turner, 74 Kennedy Avenue, Swansea, Ont., is architect.

Foreign

AGREEMENT has been made with Lucas & Luick, 231 South La Salle Street, Chicago, consulting engineers, by Moskhimenergostroy (Chemical and Power Construction Board), Soviet Russian Government, Moscow, Russia, through Amtorg Trading Corporation, 261 Fifth Avenue, New York, for technical assistance in connection with construction of artificial gas plant at or near Moscow Brown Coal Basin and building pipe line to Moscow and vicinity, about 150 miles, to cost over \$4,000,000 with equipment. Soviet Union is also planning brick manufacturing plant near Khibini, where large deposits of clay are available.

Cuauhtemoc Industries, Monterrey, Mexico, manufacturers of malt products, etc., will carry out an expansion and improvements, including installation of additional equipment, to cost over \$200,000.

Co-Operative Wholesale Society, Viborg, Finland, is planning erection of flour mill in south harbor section of city, for an initial capacity of about 1350 bbl. a day.

Department of Public Works, Government of France, Paris, is planning a fund of 360,000,000 fr. (about \$14,400,000) for air service during 1931, of which about 145,000,000 fr. (approximately \$5,800,000) will be used for new Paris airport near Versailles, including hangars, repair and reconditioning shops, administration building and other field units, and 125,000,000 fr. (about \$5,000,000) for other airports and landing fields in different parts of country with similar mechanical facilities. An appropriation of 500,000,000 fr. (about \$20,000,000) is proposed for port developments, including installation of loading cranes, conveying and other mechanical-handling machinery.

Rhine-Westphalia Electric Co., Berlin, Germany, is negotiating for acquisition of Westphalia United Electric Corp., for price of over \$15,000,000, and will consolidate. Expansion is planned in acquired territory, including transmission lines for connection with main system, power switching facilities, etc.

New Trade Publications

Air Compressors.—Sullivan Machinery Co., 400 North Michigan Avenue, Chicago. Catalog of 16 pages, in German, for distribution through this company's Vienna office (Stock im Eisenplatz 3/16). This illustrates and describes a line of air and gas compressors, and vacuum pumps. Business in Eastern Europe may be transacted through the Vienna office, which is in charge of M. G. Doll.

Variable-speed Transmission.—Link-Belt Co., Philadelphia. A new 16-page book describing the recently announced P. I. V. gear, an all-metal variable-speed transmission.

Railroads Postpone Rate Changes to April 1

WASHINGTON, Dec. 9.—Railroads have informed the Interstate Commerce Commission that they will be unable to make effective before April 1 rates prescribed in the Western Trunk Line and Eastern Class rate cases. The iron and steel rates are affected only slightly in the Eastern Class rate case. The Western Trunk Line case provides a maximum of 32½ per cent of first class for iron and steel products.

Railroads have sought reopening of the Western Trunk Line case. They contend among other things that the adjustment creates undue preference for long haul traffic and that losses have resulted to the railroads on iron and steel products.

New York Steel Treaters Visit Carbide Laboratories

The New York chapter of the American Society for Steel Treating, at its regular December meeting Monday, Dec. 8, was entertained by the Union Carbide & Carbon Research Laboratories, Long Island City, which threw open various divisions for inspection and instruction after serving a dinner to approximately 240 persons, including the laboratory staff.

After the dinner Edwin F. Cone, chairman of the chapter, introduced Dr. F. M. Becket, vice-president of several units of the Union Carbide & Carbon Corp., and president of the research laboratories, who outlined some of the research activities of the organization in various other localities and told of the centralization of some of the work by the establishing of the Long Island City laboratory in 1921.

The visitors were organized into groups and spent the evening in the following departments: welding, steel, nitriding, testing, metallurgy, miscellaneous alloys, miscellaneous re-

search, and analytical investigations. Members of the Union Carbide staff gave brief lectures on some of the work in progress.

In March the New York chapter will have a similar meeting at the new research laboratory of the International Nickel Co. at Bayonne, N. J.

Tin Plate Production Up 13.2 Per Cent in 1929

WASHINGTON, Dec. 9.—Representing an increase of 13.2 per cent in quantity and 6.6 per cent in value, the production of tin plate by 31 plants in 1929 totaled 4,031,856,278 lb. (2,015,928 net tons), valued at \$192,298,768, against 3,560,417,694 lb. (1,780,209 net tons), valued at \$180,410,038, produced in 1927 by 30 plants, according to the Bureau of the Census.

The output of terne plate last year was 345,592,260 lb. (172,796 net tons), valued at \$15,567,965, an increase of 79 per cent in quantity and 55.4 per cent in value, compared with 193,056,717 lb. (96,528 net tons), valued at \$10,016,738, reported for 1927.

Twenty-nine of the plants reporting for last year were operated as dipping departments of the mills which rolled the plates. The other two establishments were operated by tin can manufacturers who did no rolling but purchased black plate for coating.

New York Iron and Steel Market

(Concluded from page 1796)

Reinforcing Bars

Lettings are showing a seasonal decline, but pending work, including several good-sized public projects, continues to expand.

For mill shipment, distributors of concrete bars quote 1.70c. a lb., Pittsburgh, on building and paving work, and 1.80c.

on subway work (rail steel offered at \$4 a ton less); for delivery from local stock, 2.35c. a lb., New York, up to 3.05c. a lb. for lots of less than 2 tons.

Coke

Foundry coke specifications, which are considered the best index of foundry operations, are tapering as the year-end inventory periods approach. Colder weather has failed to stimulate the demand for heating coke. Furnace coke prices range from \$2.50 to \$2.60 a net ton, Connellsburg, and foundry coke quotations follow:

Special brands of beehive foundry coke, \$4.70 to \$4.85 a net ton, ovens, or \$8.41 to \$8.56 delivered to northern New Jersey, Jersey City and Newark, and \$9.29 to \$9.44 to New York and Brooklyn; by-product foundry coke, \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

Old Material

The buying price of brokers on No. 1 heavy melting steel continues at \$11 a ton, delivered eastern Pennsylvania, and about the only shipments of consequence at present are to a Coatesville, Pa., user. Heavy breakable cast scrap is being bought at \$10 a ton, delivered to a Florence, N. J., consumer, based on a sale by a broker at \$10.50, delivered. Steel car axles are off \$1 a ton to \$15, New York, on recent offers by dealers.

Dealers' buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$7.50
Heavy melting steel (yard)	\$5.25 to 5.50
No. 1 hvy. breakable cast..	6.75 to 7.00
Stove plate (steel works)..	5.00
Locomotive grate bars..	5.00
Machine shop turnings..	3.50
Short shoveling turnings..	3.50
Cast borings (blast fur. or steel works) ..	3.50
Mixed borings and turnings ..	3.00
Steel car axles ..	15.00
Iron car axles ..	19.00
Iron and steel pipe (1 in. dia, not under 2 ft. long)	7.25
Forge fire ..	7.00
No. 1 railroad wrought..	8.75
No. 1 yard wrought..	7.75
Rails for rolling ..	9.25 to 9.75
Stove plate (foundry)..	5.50
Malleable cast (railroad)..	9.50 to 10.00
Cast borings (chemical) ..	8.50 to 9.00
Prices per gross ton, deliv'd local founders:	
No. 1 machry. cast ..	\$12.50
No. 1 hvy. cast (columns, bldg. materials, etc.); cupola size ..	10.50
No. 2 cast (radiators, cast boilers, etc.) ..	10.00

Jobber Uses Airplane for Delivery of Steel

AIRPLANE delivery of steel, heavy hardware and automotive supplies has been used for some weeks quite successfully by the Robert Donahue Co., wholesale distributor of Burlington, Iowa. The company has its own pilot, Jack Lofstedt, who is shown in the plane ready to start out on the delivery route. W. M. Jones, general manager of the Donahue company says: "We have found in the short space of time we have operated an airplane for delivery service that it is very good advertising and is productive of sales in localities which had been practically impossible for us to penetrate. I think the time is not far off when most firms, both jobbers and manufacturers, will be using this means of transportation in special cases."



British Steel Industry Still Seeking Some Solution of Its Present Ills

(By Cable)

LONDON, ENGLAND, Dec. 8.

THE Continental Steel Cartel has been renewed to June 30, and the production allotment has been decreased by another 5 per cent for first quarter, subject to final approval by all members.

The president of the Board of Trade, referring to recent criticism of the Economic Advisory Committee's report on iron and steel, said that the report was not published because a large part of it consisted of confidential evidence of workers and manufacturers. He denied that the Government is withholding the report because it recommends tariffs, stating that tariffs would injure other industries dependent upon iron and steel as raw materials, and expressed the Government's earnest desire to do its best for industry and commerce, emphasizing that all industry and all commerce must partake of any benefits.

The Engineering and Allied Employers' National Federation states that British industry is in a very grave position, with sales of its products declining, unemployment large and the outlook never so dark as at present. Production costs in all industries here are greater than elsewhere, says the Federation, and salvation depends upon realization of this fact and recognition that only by con-

tinental Steel Cartel is renewed to June 30, and total output of members further curtailed.

* * *

Welsh tin plate mills to the extent of 97 per cent join in pooling their output.

* * *

German steel plants in Ruhr grow hothouse vegetables with surplus heat.

* * *

Japanese rail mill represented at Paris meeting of International Railmakers' Association.

certed effort can British industries be re-established on a competitive basis.

The Federation attributes the principal national causes of high costs to wages, taxation, local tax rates, trade union restrictions and difficulties, and costs caused by legislation. It concludes with the suggestion that any new revenue received from trade improvement, following a change in the fiscal system, be used to liquidate existing commitments, and should not be regarded as available for further extravagances.

Sir John Beynon, chairman of the board, Ebbw Vale Steel, Iron & Coal Co., has announced no immediate

prospect of revival in the iron and steel industry to justify resuming operation of the Ebbw Vale plant.

Thomas W. Ward, Ltd., has purchased the Carnforth Hematite Iron Co. plant, presumably for dismantling. Pease & Partners have reduced their headquarters staff by 25 per cent, on the recommendation of an independent financial advisory committee.

The Egyptian Government has re-awarded the Assouan Dam contract to Topham, Jones & Railton, although their tender was higher than the bid of Sir Lindsay Parkinson.

The Friedrich Krupp A. G. has secured the order for the Benha Bridge on a bid of 173,000 Egyptian pounds against Dorman, Long & Co.'s tender of 167,000 Egyptian pounds. Dorman, Long & Co. have suspended building operations on the Kasrelnil Bridge pending a satisfactory arrangement with the Egyptian Government.

About 97 per cent of the Welsh tin plate mills have joined the pooling of output plan, and makers are now considering a proposal to control selling, partly by reintroducing minimum prices.

Considerable dissatisfaction is expressed by foreign tin plate makers at what they term unnecessarily low Welsh prices. The tin plate market is still quiet with sales down to 15s. 6d. (\$3.77) per base box, although the

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.8665 (par)

British Prices f.o.b. United Kingdom Ports

Ferromanganese, export	£11 5s.	to £11 10s.	\$54.75 to \$55.95
Billets, open-hearth	5 12 1/2	to 6 5	27.34 to 30.41
Black sheets, Japanese specifications	12 5		59.61
Tin plate, per base box	0 15 3/4	to 0 16 1/4	3.83 to 3.95
Steel bars, open-hearth	7 15	to 8 5	1.69 to 1.79
Beams, open-hearth	7 7 1/2	to 7 17 1/2	1.60 to 1.71
Channels, open-hearth	7 12 1/2	to 8 12 1/2	1.66 to 1.87
Angles, open-hearth	7 7 1/2	to 7 17 1/2	1.60 to 1.71
Black sheets, No. 24 gage	9 0	to 9 5	1.95 to 2.01
Galvanized sheets, No. 24 gage	11 5		2.44

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£2 11s.	to £2 12s.	\$12.40 to \$12.65
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Billets, Thomas (nominal)	£3 14 1/2s.	to	£3 15s.	\$18.12 to \$18.24
Wire rods, low C., No. 5 B.W.G.	5 2 1/2	to	5 7 1/2	24.94 to 26.15
Rails, light	6 0			29.20
Black sheets, No. 31 gage, Japanese	11 5	to	12 12	54.68 to 58.32
Steel bars, merchant	4 7 1/2	to	4 10	Cents a Lb. 0.93 to 0.97
Beams, Thomas, British standard (nominal)	3 19	to	4 0	0.86 to 0.87
Channels, Thomas, American sections	5 12	to	5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over 1/2-in. thick	4 2	to	4 3	0.88 to 0.89
Angles, Thomas, 3-in.	4 5	to	4 6	0.91 to 0.92
Hoop and strip steel over 6-in. base	4 12 1/2	to	4 15	0.99 to 1.01
Wire, plain, No. 8 gage	3 15	to	3 17 1/2	0.84 to 0.85
Wire, barbed, 4-pt. No. 12 B.W.G.	9 12 1/2			2.09
Wire nails, base	5 15			\$1.26 a keg

usual quotations are 15s. 9d. to 16s. 3d. (\$3.83 to \$3.95) per base box, f.o.b. works port.

Galvanized sheets are inactive. Continental sheets are now selling in British home markets and substantial Indian orders are difficult to obtain.

Pig iron business is generally slow, but there is some inquiry for first quarter iron and makers expect to renew most of the expiring contracts.

Steel mills, lacking shipbuilding specifications, are endeavoring to keep operating on structural and engineering orders, but this business is declining in the domestic market.

More Long Gas Lines Planned in Germany

HAMBURG, GERMANY, Nov. 26.—Pipe for long distance gas supply has become an important tonnage product to German steel mills. The gas lines of the Ruhrgas A. G., connecting the collieries and blast furnaces in the Ruhr with Aix-la-Chapelle and principal cities in the Rhineland including Hannover, are being extended into southern Germany and Holland. At present there are about 900 km. of gas line pipe in use and the minimum installation for next year will be 150 to 200 km. With the conclusion of present negotiations with certain central and southern German municipalities, the program for next year may be nearer to 1000 km. additional.

The pipe used in these long distance supply lines is welded and 30 to 40 cm. (11 1/2 to 15 1/2 in.) in diameter. As a rule the pipe is welded and insulated after installation in the trench. The same quality of pipe being laid in Germany has been furnished to the United States and a substantial tonnage was used in an installation from Lamkin to Hodge, La.

Germany is not a large user of gas, consuming only about 51 cu. meters per capita in 1929, compared with 178 cu. meters per capita in Great Britain. Reductions in the cost of gas through long distance lines is leading to increased consumption. In recent years use of gas has increased about 25 per cent and charges per cu. ft. have declined from 7 to 9 pf. (1.67c. to 2.14c.) per cu. m. to a range of 4 1/2 to 5 1/2 pf. (1.07c. to 1.30c.) per cu. m.

Germans Grow Vegetables with Surplus Plant Heat

HAMBURG, GERMANY, Nov. 26.—Blast furnaces and steel plants in the Ruhr are beginning to use surplus heat in hot houses planted with vegetables. Adoption of this plan for consuming otherwise waste heat at the plants is not entirely experimental as two electric power plants in northwest Germany have a total of 400,000 sq. meters of vegetables growing under glass and supplied with heat from the stations (about 1000 acres).

Success of the electric power plants has been followed by the construction at several iron and steel works in the

Ruhr of hot-house vegetable gardens on what is fairly good soil, but in locations too close to the plants unless protection is provided. Preliminary surveys of the available area for planting and the amount of surplus heat at Ruhr works has led to an estimate that vegetables valued in excess of 250,000,000 m. (\$59,500,000) could be annually grown in a district which now buys its supplies from the agricultural sections of Germany. The plants also see in this plan of operating hot houses an opportunity to provide permanent work for old employees or men who have been disabled.

Japanese May Attend Rail Meeting

HAMBURG, GERMANY, Nov. 26.—At the next meeting of the International Rail Makers' Association in Paris, a representative of the Government works in Japan is expected to be present. The association has made overtures to the Japanese producer of rails in the past year, but the Government works has thus far shown no willingness to become a member. Members of the association have been seeking an agreement with Japan, as they are finding increased difficulty in competing in China, Manchuria and other Far Eastern markets. At the present meeting of the International Rail Makers' Association, German and French representatives are expected to propose a reduction in the official export price from £6 7s. 6d. (\$31.02) a metric ton, to £6 (\$29.20) a ton. Belgian rail mills are expected to propose a larger reduction in price, probably to £5 12s. 6d. (\$27.37) a ton, or £5 15s. (\$27.98) a ton.

German Company Finances Export Machinery Sales

HAMBURG, GERMANY, Nov. 26.—Extension of credit on machinery purchases by the Finanzierungsgesellschaft für Industrieleferungen A. G. of Berlin, better known as the Maschinenbank, has been extended to export markets. Financing will be provided by the company on foreign purchases, including Russian, with credit extensions up to 24 months. This action is expected to strengthen the position of German machinery builders in export markets, as many have been unable to extend even short term credits, and have sold only for cash against bill of lading.

New Jersey Wire Cloth Co., Trenton, N. J., manufacturer of wire cloth, wire netting, wire fencing and wire lath, which has been operated as a subsidiary of John A. Roebling's Sons Co., has been merged with the parent company. Sales of products of the New Jersey Wire Cloth Co. will be handled through the Roebling branches.

Switzerland Advances Aluminum Duty

BERLIN, GERMANY, Nov. 27.—Switzerland has increased the import duty on aluminum to curtail recent heavy imports of foreign aluminum, chiefly from Canada. Switzerland is one of the important aluminum producing countries of Europe.

German electric companies are using more aluminum wire for high tension transmission lines. Following Canadian investigations and tests, aluminum wire is now being used in 220,000 volt lines and recently a German company has been handling 250,000 volts on aluminum wire. The use of aluminum is said to permit a comparatively large conductor, which reduces the luminous discharge of energy usual in high voltage conductors. Some saving in electric energy is attained and the cost of aluminum cores, usually 5 x 70 or 7 x 54 strands up to 1 1/4 in. in diameter, is lower than with copper cores, because of the lighter weight of the metal. This is claimed to contribute also to a small saving in the amount of steel necessary in the transmission towers.

Russian Manganese Ore Arrives at Montreal

WASHINGTON, Dec. 9.—Approximately 3000 tons of manganese ore from a Black Sea port recently was unloaded at Montreal, according to a report received from Assistant Trade Commissioner L. A. France, Montreal. The report says that the manganese will be transhipped for Midwestern destinations in Canada and the United States. According to Canadian information, this is the first shipment of Russian manganese ever received at Montreal.

Industrial Machinery Exports Above 1928

WASHINGTON, Dec. 6.—United States exports of industrial machinery for the 10 months ended October, 1930, totaled \$193,420,000, against \$211,639,000 and \$172,380,000 in the corresponding periods of 1929 and 1928, according to the Department of Commerce. The 1930 movement exceeded by 12 per cent that of 1928, and that of 1927 by 25 per cent.

E. D. Giberson & Co., 40 Rector Street, New York, dealers in seamless and other tubing, have moved their warehouse from West Thirty-seventh Street, New York, to quarters in the Bush Terminal, Brooklyn, where a larger stock of boiler tubes, seamless steel tubing and welding rods will be carried. General offices will be in the Bush Building, but a sales office will be retained at 40 Rector Street. The company was recently appointed New York district representative of the Wrought Iron Co. of America, Lebanon, Pa.

Creep Resistance of Several Steels at High Temperature

THE resistance of plain carbon boiler plate (50,000 to 60,000 lb. per sq. in. tensile strength at room temperature) to prolonged stretching loads at high temperature, as compared with that of a molybdenum steel of similar strength and a 2 per cent nickel steel (85,000 lb. per sq. in.) has been carefully tested by E. Pohl, H. Scholz and H. Juretzek (*Stahl und Eisen*, Sept. 18, 1930). One-inch plates were tested under loads, increased by steps at temperatures from 570 to 930 deg. Fahr. The extensometer was of the Martens mirror type, the temperature was held constant within about 10 deg., and the time was measured accurately.

Each test piece was first brought to the desired temperature and then was subjected to a load equal to one-third of the yield point stress, as determined in a preliminary short-time test under the same conditions. Constant length for a period of several hours indicated equilibrium. After removing the load and determining the elastic deformation, the test was repeated under increased load, and so on until continuous flow was observed.

The creep limit is indicated by a steep slope of the elongation-time curve, which continues to grow steeper until rupture occurs. At each load below this limit the curve rises for a short time and then becomes parallel to the time axis. The following table shows the limits of creep resistance as found from these tests:

Temperature, Deg. Fahr.	Maximum Creep Resistance (Lb. per Sq. In.)		
	Plain Carbon	Nickel, 2 Per Cent	Molybdenum
570	21,600		
660		over 28,000	over 25,000
750	12,000		
840	8,100	14,000	21,300
930	under 4,600	7,600	15,900

While direct comparisons are impossible, owing to different manganese and carbon contents, it is obvious that the molybdenum steel is the least impaired by temperatures above 750 deg.

Long-time tensile tests are superior to the short-time tests at these temperatures because they give the designer a more thorough knowledge of the behavior of materials under service conditions.

Mineral Industry During 1929

A THIRTY-EIGHTH volume has been added to the annual list of publications, all giving statistical and other information, covering the mineral industries year by year. This present volume, which, like its predecessors, is from the press of McGraw-Hill Book Co., New York, and was edited by Prof. G. A. Roush, has 845 pages, of which 19 are devoted to the index. Each chapter, as has been the case for some time, was prepared by a specialist in that particular line.

Each of the principal minerals is taken up in detail in successive chapters, and the survey in general is worldwide, although particular attention is paid to operations in the United States. Iron and steel occupies 59 pages; copper, 92 pages; lead, 31 pages; tin, 26 pages; zinc, 41 pages and nickel, nine pages. These constitute, however, only a minority of the number of topics, for a great many other metals and minerals are taken care of, including both coal and petroleum, as well as the precious metals.

In the technical sections of the various chapters will be found bibliographies, in many instances, covering pub-

lications of the preceding year or more. At the end of the book is a set of statistical tables, giving in condensed form the mineral and metallurgical production of the principal countries of the world for a number of years.

How Quenching Media Affect Corrosion of Alclad Sheets

(Concluded from page 1759)

show therefore that the resistance of Alclad sheets to corrosion is much less affected by the quenching medium than that of duralumin. It appears that Alclad sheets may be quenched in a good quenching oil, such as is used in the heat treatment of steel, without serious effect either on tensile properties or corrosion resistance and with much less distortion as compared with quenching in cold water.

"Bargain" Buying Is Pennywise

(Concluded from page 1751)

schedule as to deliveries. This method will insure against overpurchasing, and against unbalanced conditions of inventories, for, should the sales department fall somewhat short of its predictions, a new balance is obtained at the beginning of the next period. These schedules are prepared far enough in advance to give the purchasing department ample time to obtain quotations, examine the reliability of its sources as to quality and delivery, and place its orders.

In order to accomplish its part of the program effectively the purchasing department must be well organized internally as to personnel, information, records and systems. A prime essential under this plan is the follow-record. This record, either in written or graphic form, should indicate, among other things, the schedule date of what is needed and, compared with this, the exact status of the order on a time basis; that is, date of placement, date of acknowledgement, promised shipping date, actual shipping date, traffic follow-up, and so on.

Inventories Under Scrutiny for Availability Value

A great deal of experience as to correct and incorrect inventory situations has been gained by bankers and industrial managers during the period of depression. Inventories will be examined much closer in the future, especially the real availability value of the inventory. The relationship between inventories and other financial devices will be computed more carefully and taken into account in determining the inventory total during various periods of the year. There is a definite relationship between inventories and gross sales, and in an evenly balanced business this factor should be fairly stable.

Similarly, there is a close relationship between gross profits and inventories. If gross profits are abnormally high during any period and cannot be accounted for by unusual profit-making conditions during the period, then there is a probability of overstatement of inventory values. Good management warrants the adoption of inventory and purchasing control plans and comparative records of measurement to indicate that a healthy balance exists.

Business as Others See It

Digest of Current Financial and Economic Opinion

POLITICAL influences are "viewed with alarm" by three of our commentators this week. *Commerce and Finance*, *Annalist* and *Business Week* all pay their compliments to the devastation a bull-in-a-china-shop Congress is capable of producing. The first-named thinks that, if the attitude of Congress, once gaged, is found "reassuring, a distinct revival after New Year's may be expected."

But the others point to a "December assembling which commonly implies more or less resulting disturbance of business sentiment," and the "prospect of increased taxes and congressional chaos."

Expects Good Upturn in Spring

However, *Annalist* thinks "not unreasonable an expectation that by February or early March the spirit of business men . . . will feel and react to the stimulation which the opening of spring always brings. That stimulation . . . not overshadowed by depression, as the coming winter is, ought to bring about the beginning of those successful ventures which

initiate the building up of a period of prosperity."

Much of this same optimism regarding the early spring is felt by National City Bank of New York, which writes: "In times like these the influences of depression are cumulative, and it is usual for the outlook to appear more and more unpromising in proportion as the depression nears its end. . . . Probably business will at first fail to recognize the turn for the better, in the same manner that it failed to appraise correctly the downturn, which began in the summer of 1929. At this stage of every depression the visibility is bound to be low."

Slow, But Sure, Is the Slogan

A slow upturn early in 1931 is predicted by Brookmire Economic Service—"in either the first or second quarter. The rise will undoubtedly be slow and irregular, probably distinctly disappointing to most people. By the middle or fall of 1931, it is possible that the upward curve may assume a sharp slant. We feel, however, that any precipitous advance would soon

give way to a secondary reaction. . . . We doubt whether a normal level of business will be reached before the spring of 1932."

A great replacement demand which is certain to be amplified by demand for additional products is seen, by Alexander Hamilton Institute, to be in the making. This latter feature is emphasized by Silberling, which says: "It is true that there is over-production in many directions. But there is also under-production of many semi-luxuries, due partly to the slow development of new wants among the mass of the people and the survival of low efficiency in many lines of production."

How Deep Is the Depression Valley?

Many widely varying estimates of the extent of recession are current. Alexander Hamilton Institute says manufacturing activity is down 31.5 per cent, with the value of output down 41.5 per cent. These figures compare with 27.5 and 33.4 per cent in 1923-1924 and with 34.4 and 62.2 per cent in 1920-1921.

Many Factors Determine Cost of Using Welding

(Concluded from page 1767)

that the life of a pressure vessel welded in a certain way was 400,000 cycles of service as compared with 5000 cycles when welded another way. These tests established the relative economic value of the product when welded by the two methods.

Lack of Cost Data

There is a woeful lack of cost information in the welding field, declared James W. Owens, Welding Engineering and Research Corp., New York, in discussing Mr. Kinkead's paper. Bids for welded work vary widely, he said, leading to the conclusion that welding companies do not know their costs. Manufacturers of welding apparatus must know how to figure cost. They do not take into consideration all savings effected by welding in place of riveting such as in making drawings. Often cost of routing can be reduced. All factors must be analyzed. Otherwise the economic value of welding cannot be determined. The additional time required for welding is more than overcome by the saving in other departments. He believed a shipyard doing \$20,000,000 worth of business a year could save \$1,000,000 by substituting welding.

Another speaker expressed the opinion that there is no better indicator of welding costs than labor,

material and overhead. Another blamed improper supervision and operators for too high costs. Attention was called to savings effected by re-design of apparatus made possible by welding.

Surveys European Furnace Practice

LECTURING recently before the South Wales Institute of Engineers at Swansea on steel works practice, H. C. Wood declared that practically the whole of the steel output in Great Britain today is produced by the Siemens-Martin (open-hearth) process. In Continental Europe, however, the Siemens-Martin process has for over 50 years found a strong competitor in the basic Bessemer converter, or Thomas process.

"Outputs obtained in Continental steel works," the lecturer said, "are found to be generally in advance of those in Great Britain. In South Wales they are more particularly concerned with cold-metal working, using 70 per cent scrap and 30 per cent pig iron. I am an advocate of a furnace not using cooling water, or using it in as small a quantity as possible. I strongly advise that full consideration should be given to the Terni system of furnace, which I believe, represents today the biggest advance. I do not think, however, that we have reached finality in furnace design, although we are going in the right direction."

THIS ISSUE IN BRIEF

December 18, 1930

Machining Costs Cut

Precision forgings require less machining. Closer tolerances increase forging costs, but increase is oftentimes more than counterbalanced by saving in the machining costs.—Page 1841.

* * *

Is "Warm-rolled Strip Coming?

Between cold-rolled (room temperatures) and hot-rolled (1300 deg. up) is an undeveloped field in which we may find technical applications.—Page 1842.

* * *

To Increase Cutting Tool Efficiency

High-speed steel cutting tools tempered at 590 deg. C., after hardening, will cut for a considerably longer time when untempered.—Page 1851.

* * *

Frozen Molding Sand Avoided

Sand storage room is used as a cooling chamber for hot castings. This prevents sand from freezing and cools castings by heat interchange.—Page 1836.

* * *

X-ray Locates Weld Flaws

Pressure vessels with welded seams are passed before X-ray camera in routine test in boiler plant. Cavities 2 per cent of wall thickness, even less, can be detected.—Page 1828.

Sand-rammers with Cushioned Feet

Automatic rammer's feet have compression springs. They press without pounding, preventing over-packing of the sand.—Page 1835.

* * *

Galvanizer's Critical Point

Above 900 deg. F. pot wear is rapid. Proportion of iron in zinc-iron alloy increases sharply.—Page 1854.

* * *

Speeds Core-making

Operator need not pick up or lay down vent plate. Plate is suspended from a spring. It rises up out of the way when released. Strike-off rests on electrically heated plate. Warm strike-off does a cleaner job. Sand will not adhere.—Page 1839.

* * *

Glorifies the Rivet

To enhance the exterior beauty of its striking new glass-and-steel office building, pressed steel company uses rivets with abnormally large heads.—Page 1824.

* * *

Dripping Water Breaks Cupola Slag

Steady dripping prevents slag from adhering to receptacles.—Page 1837.

* * *

Moving Belt Knocks Out Cores

Castings are hung on a continuous chain and bumped against knockers on a continuous belt below, operating in opposite direction.—Page 1839.

* * *

Cold-rolling Without Annealing

Even stainless steels can be cold-rolled without intermediate annealing, on Steckel mill. As many as 13 annealings are saved.—Page 1845.

* * *

Hardening High-speed Steel Tools

At 1325 deg. C. (highest temperature possible without overheating) steel should not be held longer than two min. or overheating will result.—Page 1849.

Cold-rolled Strip Age-hardens

Hardening is greatest during 10 days after rolling. Gain ranges from one to nine Rockwell points.—Page 1845.

* * *

A Tower of Shining Steel

No overlying material but aluminum bronze paint covers the steel exterior walls of new factory office building. It gleams like polished steel.—Page 1823.

* * *

Pressed Steel Museum Established

Old and modern specimens of hammered and pressed steel makers' art will be included in stamping manufacturer's collection.—Page 1824.

* * *

X-ray Inspection at 40c. per Foot

For welded plate of more than two in. thickness, cost will range up to \$2.75 (for 3 1/4 in. plate) per foot of welded seam.—Page 1831.

* * *

Heat-treating High-speed Steel

In tempering after hardening, a lead or salt bath furnace should be used. Check the temperature by means of a gaged thermocouple.—Page 1852.

NEXT WEEK

Precise shop methods. Included are rigorously maintained closeness to dimensions in pressing sheet aluminum, in screw machine work, in milling and in grinding.

Costs of making pipe ascertained per 100 ft. of each size. Wage incentives and supervisory bonuses also feature production management of Page Hersey Tubes, Ltd.

Standardization of process for hardening screws. Equipment and apparatus selected to promote close control of heat-treatment.

The Improved Automatic Thread Chasing Attachment

Combines engine lathe accuracy with the speed of the turret lathe on which it is mounted.



The circular formed tool is ground in the thread. It cuts inside and outside threads. Both right and lefthand.

JONES & LAMSON MACHINE CO.
Springfield, Vt.

